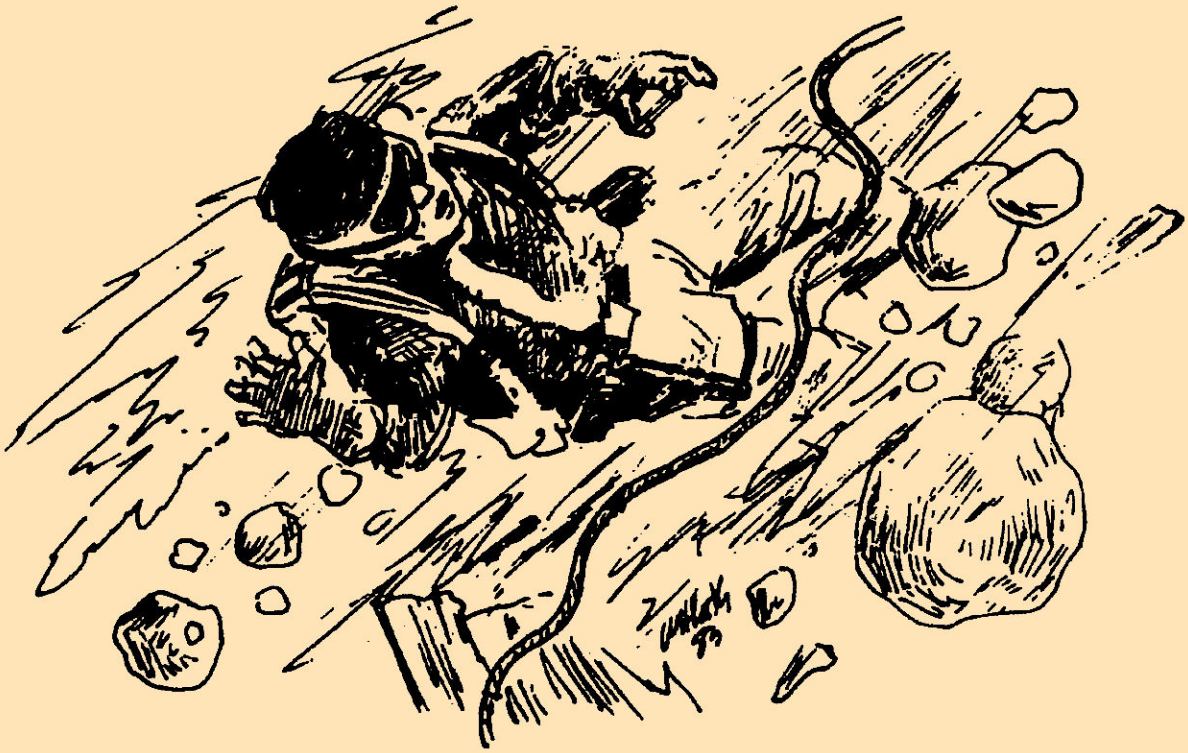
THE ARCTIC ENVIRONMENT

by J. Andrew Keith



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J. Andrew Keith

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SECTION I: RULES

Introduction

The Arctic Environment is a supplement for *Traveller* dealing with the particular problems connected with survival, movement, and other activities in sub-zero conditions. It is equally applicable to groups in polar regions of an Earthlike world, or those on worlds where the surface temperature never rises above freezing, or on the sunless side of tidally locked planets, or even in wilderness regions of temperate planets during winter months; all of these situations can be covered by the basic rules discussed in this booklet.

The material presented here is intended to expand, not replace the basic *Traveller* rules. It provides guidelines, procedures, and ideas that the referee may feel free to apply or ignore at his or her discretion. As with all *Traveller* rules booklets, the referee's judgement and interpretation is the actual last word in. the usability of the concepts introduced here.

This booklet is divided into three major sections. First comes Rules, which outlines specific procedures for dealing with movement, survival, and general activities in arctic conditions. The second section deals with Equipment of use in the arctic environment, from cold weather clothing to sophisticated vehicles built to move over snow and ice. Finally, there is a section delineating Special Encounters and Events common to arctic regions and other subzero situations. A short discussion of possible adventure applications is also included.

The referee may feel free to use this booklet in connection with *The Mountain Environment*, a previous volume in this series dealing with *Traveller* environments; the details on snow and ice terrain and arctic survival can be of use in conjunction with the conditions found on high mountains, which were addressed in far less detail in the mountain volume.

Except where specifically noted, all normal *Traveller* rules and rules interpretations are in effect. The referee may freely alter or disregard individual rules presented in this chapter to tailor the material to the tastes and abilities of a specific gaming group. Care should always be taken, however, to ensure that a given modification is carried over into all areas which might reasonably be affected by the basic alteration.

SKILLS

Several new skills are introduced in this booklet to cover the various aspects of training and experience in arctic conditions. There are two basic categories of skills involved, survival and transportation.

Survival: A single skill, arctic survival, is included in this category. It represents expertise in staying alive in the harsh conditions of severely cold weather and other arctic dangers.

Few characters begin life with any thorough knowledge of arctic conditions, but there is a chance that the individual has been raised in conditions that grant some familiarity with arctic survival skill. Characters should roll 8+ on 2d to receive an initial level of arctic survival skill; no DMs are applied. If, however, the individual is known to come from a background that would require such skill, the skill is received automatically. (Equally, if background precludes the skill, no roll is made at all). Background may be established through the cooperation of the player and referee, or as a result of a character's origins on a world where cold weather conditions prevail (as with some planets in the Gamelords "Pilot's Guide" supplements, where surface temperatures are given. See also the Gamelords booklet *Grand Survey,* which discusses planetary surface temperatures in detail, if more information on establishing such backgrounds is desired.)

When an initial skill level is to be received, it is set by a roll of 1d-4; a result of 0 or less gives a skill level of 0, indicating familiarity but no real expertise, with the principles of arctic survival skill.

Arctic survival skill can be improved in various ways during the career process. Characters in the Army or Marines may receive the skill in any term in which a 10+ is rolled; DM-1 for Marines. If using *Mercenary,* the roll is made yearly, with a DM+1 allowed to Commandos, and to any character on Training, Garrison, Raid, or Police Action. If the throw is made, Arctic Survival-1 is received at once. In addition, any character under any character generation system receiving results of +1 Endurance, Survival, or Hunting may substitute Arctic Survival skill instead. If desired, characters entering the Hunter career (Supplement 4, *Citizens of the Imperium*) may instead be considered to be professional arctic explorers, with all career information as given in Supplement 4 except for the consistent substitution of Arctic survival skill for Hunting skill, and of Hunting for the original survival skill granted in the Acquired Skills Table.

Finally, Arctic Survival skill can be developed through any of the training methods open to *Traveller* characters -- self improvement, mercenary instruction, and so forth.

The actual applications of Arctic Survival skill are summed up below; specific uses for the skill also appear throughout this manuscript.

Arctic Survival: The individual is familiar with both the theory and practice of staying alive in subzero conditions.

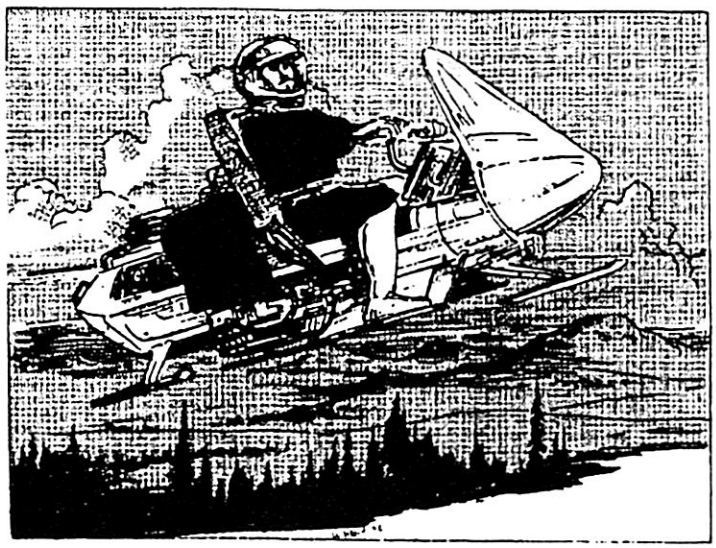
Characters with Arctic Survival expertise have a better chance of coping with arctic conditions. This is shown throughout this text as a modifier on endurance loss due to cold and other survival-oriented processes. The skill also should use it as an indicator and/or modifier to the chances of locating food and water, constructing or finding natural weapons and shelter, and finding their way across country under arctic conditions. Finally, it should serve as a DM in averting or noticing specific hazards before they threaten the character.

Where groups are cooperating, all characters can be assumed to have a survival skill one less than that of the most experienced character (where their skill is lower to begin with), representing the guidance and assistance of the expert of the group.

Transport Skills: There are a wide variety of specific skills associated with transportation in the arctic environment. All are summed up in a single general skill, *Arctic Transport.*

This basic skill is a new cascade skill under the heading of "Vehicle;" it can be inserted into the cascade skill hierarchy of any of the various interpretations of vehicle skill found in *Traveller* rules. (Different versions are found in basic *Traveller* (*Mercenary, High Guard,* and *Citizens.*)

Arctic Transportation skill has, in turn a hierarchy of cascade effects covering several specific forms of transportation. While all transportation skills have the same broad application as any standard vehicle skill, there are some specific special considerations, which are explained under the appropriate headings.



Arctic Transportation skills are earned as a function of the usual occurrence of Vehicle skill, or through Mercenary instruction, self-improvement, and similar *Traveller* procedures. In addition, one level of skill is earned each time Arctic Survival skill is earned, automatically.

Arctic Transportation: The individual is trained in the use of some specific vehicle or form of transport used in arctic conditions.

A character that receives this skill must immediately choose one of several "cascade skills" from the list below.

These are explained individually in the section following.

Specific cascade skills include the following: Arctic Driver, Hovercraft, Iceboat, Skating, Skiing, Sled, Snowmobile, Tracked Vehicle. These skills are each totally different, and conversion between skills (as with standard vehicle cascade skills) is not possible.

These skills are primarily used as a guideline for operation and a DM against accident; additional effects are discussed below.

Cascade Skills: The specific cascade skills for Arctic Transportation are summed up below, though effects for some are also discussed in later appropriate sections of the text.

Arctic Driver: The operation of any normal vehicle in extreme conditions of snow and ice requires an entirely different set of reactions and abilities. Arctic Driver skill represents the skill of the character in dealing with these special conditions. The Arctic Driver skill level is averaged with the skill in the vehicle being operated to determine the skill with which that vehicle may be operated. However, the modified skill may never be higher than the vehicle skill level for that vehicle, no matter how high Arctic Driver skill may be.

Specific skills that may be averaged in this way are Wheeled Vehicle, Tracked Vehicle, Grav Vehicle, Hovercraft, and all Aircraft cascade skills; no other vehicle skill needs to be averaged in Arctic Conditions.

All characters should automatically have an Arctic Driver-0 skill level if otherwise without training.

Hovercraft: This skill is identical to the standard hovercraft skill. Hovercrafts are extremely useful in tundra or over open ice, though they are unable to operate in most severe weather.

Iceboat: This is skill in the operation of an iceboat, a sailing craft operating on runners over large expanses of ice. Iceboats are extremely rare; the skill should be confined to hobbyists or natives of worlds where extensive ice cover makes this a natural way to travel (which is established, as the referee desires). Iceboat skill should not be earned as a result of military service except in armies of such worlds.

Skating: The character is trained in the use of ice skates. Skating skill is strictly used to avoid mishaps while travelling across ice on skates.

Skiing: The character is trained in the use of skis as a method of cross-country travel. The skill does *not* take in such sporting areas as downhill speed skiing, slalom, or ski jumping (though it is conceivable that any of these could be introduced as a hobby). Rules elsewhere in this supplement cover in detail the use of skis for movement across arctic terrain.

Sled: Sled skill covers the use of animal-drawn vehicles using runners. It is the equivalent of Equestrian or Teamster skills, which appear in certain other *Traveller* products. In general, the skill is available only to hobbyists or to characters from arctic environments on worlds of tech level 5 or lower. Also, sled skill applies at full level only with a team of animals familiar to the character; on alien worlds, where familiar animal teams are not available, reduce the skill level by 2.

Snowmobile: The snowmobile is a small vehicle specifically designed for transport over snow. The skill is applied as a standard vehicle skill, but without the need to

average Arctic Driver skill (since the skill can only *apply* to arctic conditions in the first place).

Tracked Vehicle: This is the standard *Traveller* skill; tracked vehicles are among the most common of all arctic vehicles due to reliability and efficiency. Tracked vehicle skill must still be averaged with Arctic Driver skill when used in subzero conditions.

Hobby Skills: A few of the skills that are discussed above are said to be primarily learned by hobbyists. A character may elect to take up one of these areas (which include snowmobiles, skiing, skating, and most especially, iceboating and sledding) by first rolling Social level or less and announcing the intention to take this up as a hobby. Thereafter, all earned transport skills must be taken in the single hobby area until the character renounces the hobby again. Only skills earned in the military may be from outside the hobby area; military skills would include snowmobile, skiing, tracked vehicle, hovercraft, and arctic driver.

Enforcement of the concept of hobbies is strictly up to the referee, but it is suggested that iceboating and sledding be harder to obtain without a major commitment than any other arctic transport skill, due to their comparative rarity in technological societies.

THE SUBZERO ENVIRONMENT

Arctic terrain and weather has an important impact upon the problems of survival and operations in the conditions prevailing in these regions. The problem of determining the type and effects of each is in the hands of the referee, following the guidelines presented in this section.

Subzero Conditions: In general, there are three basic categories of subzero environment to be considered. These are classified as various regions, as follows.

Temperate-Winter Regions: These are regions where the average or "mean temperature" is generally above freezing (O°C), but where winter conditions can drop the temperature below that point. Temperate regions of an ordinary world are the most common case, but worlds with highly eccentric orbits or variable or multiple star systems may also experience periodic "winters" that cause the temperature to drop in an otherwise temperate region.

Subarctic Regions: Subarctic regions are those areas where the average temperature is below O°C, but occasional warming brings the temperature above that temperature. They are very similar to temperate-winter regions, but winters are longer and colder, and summers shorter and more intense.

Arctic Regions: An arctic region is an area where the temperature rarely rises above freezing. This would not only include the polar regions of Earthlike worlds, but also the dark sides of tidally locked planets and any worlds where the temperature simply isn't high enough to justify either of the other categories.

There is, of course, some overlap between these areas; there is no such thing as an absolute way of categorizing such regions. But these guidelines can help the referee adopt certain standards in determining terrain and weather conditions in given situations.

Terrain Determination and Effects: A number of specific terrain types will occur in the subzero environment.

Terrain in Temperate-Winter Regions: In these areas, virtually any type of terrain is possible. Since winter is a periodic but non-permanent aspect of the climate, it does less to shape the lay of the land than do subzero conditions in more severely affected regions.

Tundra: Tundra terrain occurs in subarctic regions. Tundra plains are broad, flat, and treeless; in winter, they are frozen ground, while in summer they become wet and marshy. Because they are open and level, tundra regions are easy to cross, though in summer the marches become hazardous. Tundra terrain is ideal for hovercrafts.

Permafrost: Permafrost terrain is similar to tundra, but occurs in regions where no summer ever melts the water in the frozen ground. Permafrost regions tend to be fairly level and open, and thus easy to cross. They are very difficult to dig in, however.

Shelf Ice: Shelf Ice terrain is ice that is permanently part of a continental landmass. Due to the shallowness of water and the cooling of the adjacent land, the shelf ice has a degree of permanence, though it may change configuration as a result of temperature changes. Shelf ice occurs only in arctic regions. Effects of ice on movement are treated in detail later in this chapter.

Pack Ice: Pack ice is the sort of ice that forms in arctic and subarctic regions in deep water, away from continental landmasses. Pack Ice, even in the coldest of arctic regions, is considerably less stable than shelf ice. Warming, both from sunlight and, more commonly, from shifting ocean currents, causes pack ice to break up, creating icebergs and drifting floes. Pack ice is far from permanent, and can cause terrain shifts that can alter the nature of the "ground" considerably over a short time.

Temporary Ice: Temporary ice forms over small bodies of landlocked water during temperate-winter periods. Lakes, rivers, and streams can be covered with ice in very cold conditions, particularly when in the grip of a prolonged subzero period.

Powder Snow: A region will be covered by powdery snow under certain conditions of humidity and temperature following a snowfall. Powder snow offers the best conditions for most forms of movement. Specifics on movement over snow are discussed in a later section.

Wet Snow: Wet snow is a less efficient medium when it comes to movement.

Deep Snow: Whether powder snow or wet snow, there is more difficulty to movement over especially deep snow, especially snow in excess of 112 meter in depth.

Mountainous Terrain: Rugged terrain is characteristic of many subarctic or temperate-winter regions, due to glaciation. Types of mountain terrain, and methods of dealing with movement in mountain regions, are dealt with in *The Mountain Environment,* another volume in the Environment series.

Occurrence of Snow and Ice: Obviously, snow or ice terrain will occur only where conditions are appropriate. This means, first and foremost, that water must be present on the world; a planet without a hydrosphere won't have significant amounts of ice and snow present.

Tundra and permafrost terrain's are the most common dry-land terrain types in arctic and subarctic regions, though mountains and other types of rugged terrain do occur, as well. However, a snowfall over tundra or permafrost transforms the nature of the terrain greatly, so it is necessary to determine the terrain type with some care.

A series of charts and tables provided in the appendix of this booklet, deal with terrain types and conditions, and how these may be determined.

Terrain and Snowcover Determination: To establish terrain conditions, follow the steps presented below.

Basic Terrain: The Basic Terrain Table is used in arctic or subarctic regions; in other areas, terrain should be established in accordance with the terrain in the hex on the world map and/or selected as the referee desires. Two methods of terrain selection are possible, *mapping* or *free-form.*

When mapping, the referee chooses a scale and creates a hexgrid map of the region to be crossed. When the scale is less than 1 hex = 10 km, roll 1d for each hex to determine basic terrain in that hex.

The free-form system is used when the map scale is larger, or when use of a map is not desired. Every hour, roll 2d for the terrain being passed over.

Snow Cover: The Cloudiness and Humidity Chart gives a basic "Snow Cover Chance." If a 2d roll is less than this number, a particular stretch of basic terrain will be covered by snow of one type or another. Snowfall Modifiers are applied to the snow cover roll from the list of Modifiers. Once the presence of snow cover has been determined, roll on the appropriate Snow Cover table to determine the type of snow covers present. All snow covers are shallow (1/4 cm to 3 cm in depth) unless otherwise indicated.

Snow covers can also accumulate as a result of weather, changing the original snow cover over the course of several hours of snowfall. This is covered in a later section.

Note that snow cover invariably refers to the amount of "new snow;" beneath this surface cover there could actually be several meters of "hardpack snow."

WEATHER

The tables in the center pullout include several which regulate snowfall on typical worlds. These tables should be used to determine weather on a daily basis.

Snowfall is based on the world's humidity, which in turn is derived from the hydrographic percentage. The Cloudiness and Humidity Chart gives the humidity factor of any particular world, found by reading across from the appropriate hydrographic code. This factor is the basic chance of precipitation at any given point on any particular day.

Each day, the referee should roll 2d and compare the result to the humidity factor. If the throw is less than the humidity number (including all applicable Snowfall Modifiers from the list in the tables' section), snow will fall that day. (Should the temperature be above freezing, this will become rain, instead).

The Snowfall Intensity and Duration table is then used to determine the type and length of the snowfall. Throw 2d to determine the intensity of the storm; this will give a general description of the snowfall to be expected, and a die modifier that is applied to a second 2d roll that gives the duration of the snow.

Accumulation of snow is found by taking the duration of the storm and the accumulation rates given for each type of storm. This accumulation is added to any snow already present, possibly changing the snow cover over any particular stretch of terrain. Another table determines the nature of this new snow. For the sake of convenience, assume that the storm will drop snow over the whole area covered in a day's march, but not beyond.

The referee may, if desired, develop additional tables for variation between worlds, or can tackle the subject of snowstorms in greater detail than is given here, but these basic procedures are sufficient to simulate the most important aspects of snowfall.

Cloudiness: Clouds may serve to make navigation difficult, or to inhibit the effective use of aircraft or grav vehicles. Cloudiness is determined from the Cloudiness and Humidity chart. Once every 12 hours, roll for cloudiness, with a 2d throw greater than the cloudiness factor on the chart indicating clear skies. Obviously, if a storm is occurring the sky will automatically be cloudy.

When the sky is cloudy, navigation without instruments is impossible, and vehicles in the air must fly low -- nape of the earth -- to maintain contact with the ground. In this mode, air speeds are halved, and the vehicles are subject to weather and wind effects of the surface climate. Aircraft of grav vehicles that fly higher than NOE mode may do so at full given speeds, and are not subject to winds or storm conditions. However, if the sky is cloudy they will be unable to spot anything on the ground, and must navigate by instruments,

rather than landmarks. To land, they must of course descend below the clouds and risk local weather conditions.

TEMPERATURE

The Gamelords supplement Grand Survey gives a detailed system for the specification of surface temperatures anywhere on a planet. For the purposes of this booklet, however, such detail is unnecessary; we will content ourselves with a streamlined system for determining temperature conditions. This will hinge around a simple "basic local temperature" which, in *The Arctic Environment,* is established essentially randomly. If *Grand Survey* is available, use the procedures given in that book to determine local temperature.

In this supplement, roll 2d on the temperature table to determine the basic local temperature. Read the temperature under the column that corresponds to the region in which the temperature is being determined. This basic temperature should be re-rolled every 1d days, to simulate changes in local weather conditions.

Once basic temperature is determined, the referee knows the sea-level temperature for a time shortly after dawn. Further modifications are then applied.

Altitude: Temperature decreases by 1°C for every 200 meters elevation above sea level.

Daytime: When the day is at its warmest, the temperature will be higher than the basic temperature. The increase is found by subtracting the planet's atmosphere code (A) from 15. During the course of the day, the temperature will rise steadily to this maximum, and then begin to decline.

Nighttime: The same formula, (15*-A), is used to determine the drop in temperature during the night. Halfway through the night, the temperature reaches its lowest ebb and then begins to rise once more.

Day and Night in the Arctic Environment: It should be remembered that in many true arctic regions the axial tilt of a world will cause the day and night to be equal to half the planet's year; other worlds, such as these which are tidally locked, may have "arctic" regions where the sun never shines. The referee should determine when such conditions prevail, and deal with them accordingly; in *Grand Survey,* methods for determining and using these factors are spelled out.

Temperature Effects: Cold weather has a number of important effects on characters in the Arctic Environment. Characters are, of course, directly affected by severely cold weather; details on how cold can be dealt with are presented in a separate rules section.

Cold can also affect various types of vehicles, especially primitive ones making use of internal combustion engines. These effects are dealt with in discussions of vehicles in the arctic.

In addition, of course, a temperature above 0°C causes snow and ice to begin melting, and additional snow turns to rain, instead. Melting is an uneven process. A good rule of thumb is to remove 1d x 112 centimeters of snow cover per hour per 5° above 0; thus, every hour in +10°C weather would result in the melting of 2d x 112 cm. If hardpack snow is present, the referee should determine its depth (1d x 1d x 5 cm is a good figure, though the referee is free to choose other values, as desired). If rain falls during this period, treat a moderate storm as an additional +10°, and a heavy storm as an additional +20°, for each hour of rain.

WIND

Wind can be a killer in the arctic Environment; the speed of the wind can mean life or death for characters caught without sufficient protection.

Wind velocities should be established every 12 hours, by rolling on the Wind Velocity Table (with the DMs shown). This establishes the average velocity; it also notes the nature of the wind, steady or gusty. Steady winds blow at the indicated speeds fairly constantly; gusty winds can double in speed 1d times per hour (or a maximum of once every 10 minutes).

Wind Effects: The principal effect of wind is to affect the "wind chill factor;" winds can lower the apparent air temperature dramatically, causing unprotected characters for more danger than the actual temperature would otherwise warrant. This is dealt with in detail in a later section. Blowing snow can also hamper visibility and movement.

High winds also pose a handicap to grav vehicles and aircraft, and are discussed in this connection in the section on vehicles.

MOVEMENT ON SNOW AND ICE

Both snow and ice pose special problems for characters attempting to move under their own power. Various modes of movement are affected in different ways, as discussed below.

Movement on Foot: Characters moving on foot will be greatly slowed by both snow and ice. Snow primarily slows a character down and causes rapid exhaustion, while ice also reduces speed and has a tendency to cause falls and other

mishaps. The Movement Effects Chart shows reductions in speed and other problems.

The basic foot movement rate is considered to be 5 kph. Faster speeds are possible, but cannot be sustained over long periods. Moreover, snow hampers running, making a slow walk necessary for steady progress.

Snowshoes: Snowshoes are broad, flat, webbed frames designed to distribute an individual's weight over snow, and hence to prevent the individual from becoming as bogged down as an ordinary individual on foot. They are fairly easy to use (and hence do not require a skill.(as skis or skates do). Characters on snowshoes begin with the basic foot movement rate, but, as the table shows, use different movement modifiers. Walking on snowshoes is also more tiring, and has a slightly higher chance of mishaps than walking without them.

Skis: The use of skis for cross-country travel is a fast and efficient method of arctic travel. Skis will not work unless the snow cover is shallow or deep, but, under those conditions (or, less efficiently, on ice) skis make it possible to move quite quickly. There is a high chance of mishaps, but the indicated mishap throw receives a die modification equal to the character's Skiing skill level.

The basic movement rate for ski travel depends on the nature of terrain. The Ski Movement Chart shows the maximum speeds possible for characters on skis depending upon slope. Most cross-country skiing is done on the "level" line, but the referee may feel free to indicate when a stretch of slope exists that will speed up or slow down travel. (For really rugged country, see *The Mountain Environment* for slope angles and other terrain features).

Travel on skis over bare ice is possible, but at half the level ski movement rate.

Within the limits set by the ski movement table, the character has considerable control over actual speed. This is regulated by skill. Going level or uphill, higher levels of skill permit faster movement; the skill level x 20% of the chart value is the actual movement rate a skier can achieve. Downhill, the problem is to counteract momentum; again multiply skill level x 20% of the chart value. This time, however, the resulting speed is *subtracted* from the maximum speed, and gives the range of speeds the character may choose to make use of. Thus, skill 5+ always has full control of downhill speed.

It should be noted that speeds given on the table assume optimum snow conditions; the referee may reduce these by up to 1d x 15%'under any given circumstances, if desired. This is strictly up to the referee to implement.

Skates: Ice skates can be extremely useful, in the hands of skilled characters, for movement across wide expanses of fairly level ice.

The basic movement rate for characters on ice skates is set by the character's skill. A skill level of 1 permits 5 kph; level-1, 10 kph, level-3, 15 kph, and so forth. Speeds can be doubled for brief periods, but an extra mishap roll must be made every 10 minutes when doubled skating speed is in use.

Mishaps: A mishap roll is assigned to each mode of movement for ice or snow. Every hour, or more frequently when indicated above, a 2d throw is made. If the roll is equal to the mishap numbers given, the mishap occurs. Skiers and skaters reduce the mishap throw by an amount equal to the skill in use.

For individuals, a mishap generally indicates a fall, with a consequent chance of damage. When a mishap takes place, the character must roll dexterity or less to avoid taking 1d damage. However, any roll of 12, regardless of dexterity, indicates that the character has suffered a serious accident; 2d damage is suffered, and the character cannot walk. On a 1-4, the injury is a severe sprain, which heals in 2d days. On a 5-6, it is a broken bone, requiring 1d+3 weeks (4-9, total) to heal completely. During that time, if the character walks at all it will be slowly, awkwardly, and with considerable pain; skiing, skating, and the like are out of the question.

Endurance: The chart provides information on endurance for the various modes of movement. Endurance is covered in detail in a later section.

VEHICLES IN THE ARCTIC ENVIRONMENT

The use of vehicles in the arctic environment is hampered by considerations of surface conditions, weather, and temperature. Some vehicles are better suited to arctic conditions than others, as noted below.

Internal Combustion Engines: Powered vehicles built at tech levels 4-8 are subject to specific dangers as a result of low temperatures. There are two principal problems: ignition failure and engine failure.

Ignition Failure: This results when the vehicle's battery cannot deliver sufficient power to start the engine. The chart below shows the chances of ignition failure due to cold weather; roll 2d, with ignition failure resulting if the given throw is achieved. Temperature should be the apparent temperature the vehicle is exposed to; if in the wind, use the effects of Wind Chill to determine the temperature (see the Wind Chill Chart); if sheltered, use the actual temperature.

COLD ENGINE FAILURES TABLE

Apparent Temperature	Ignition Failure Throw	Engine Failure Throw
0°C	13+	14+
-5°C	11+	12+
-10°C	9+	10+
-15°C	7+	8+
-20°C	5+	6+
-25°C	3+	4+
-30°C	1+	2+

Throw DMs should be set by the referee in accordance with lack of maintenance or poor reliability (+DMs), or exceptional maintenance or special protective measures (-DMs).

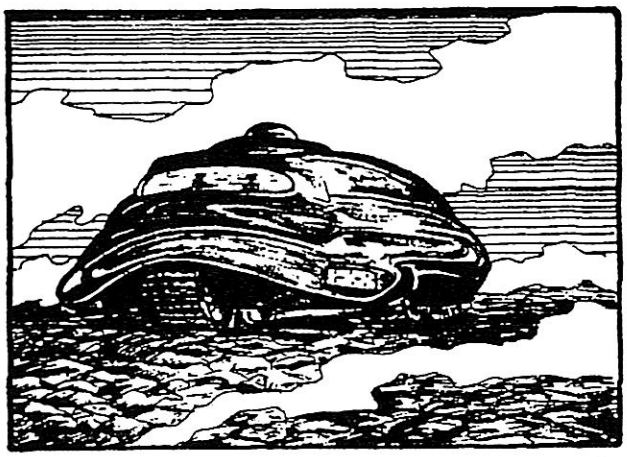
Engine Failure: This results from an actual freezing of the water circulation system that cools internal combustion

engines. Where the ignition failure result merely makes it impossible to start the vehicle, requiring a battery recharge or replacement, an engine failure is a serious matter that can render an entire engine inoperative. Engine failures require 1d x 1d hours of repair by a trained mechanic (mechanic-2+), and parts amounting to 1d x Cr 250 in value.

Engine antifreezes are available; various types grant various die modifiers, from -1 to -6, to the Engine Failure throw. An engine can be climatized for arctic use by payment of Cr 5 per DM applied (Cr 10 per DM over -6); when using a vehicle chosen at random, without an established DM, roll 1d to determine the winterization applied.

Wheeled Vehicles: Wheeled vehicles are the least efficient vehicles for use in arctic conditions. The Movement Effects Table shows the movement limitations on the basic speed (use the off-road vehicle speed given in basic *Traveller* for travel on snow and ice.

Mishaps for wheeled vehicles can involve such possibilities as loss of traction, damage from concealed debris under the snow, or dangerous skids. The mishap roll should be reduced by the average of Arctic Driver and Wheeled Vehicle skill, and raised by referee-assigned DMs for speed and other factors. Exact mishap effects are left up to the referee, based on the determined nature of the accident.



Tracked Vehicles: Tracked vehicles are significantly more effective in snow and ice than wheeled vehicles, but all procedures are basically the same.

Air Vehicles: Air vehicles include hovercraft, aircraft (fixed wing aircraft, helicopters, dirigibles, etc.) and grav vehicles (including personal grav belts). Snow and ice has little effect on air vehicles, though landings made on ice or in deep snow should require avoidance of a mishap throw of 10+ (DM - vehicle skill averaged with Arctic Driver skill).

The most serious problem for aircraft of all types, however, is that caused by high winds. When flying below cloud cover or making takeoffs or landings, mishap rolls based on wind speeds are required. Low-flying vehicles roll once per hour, with an additional roll for the takeoff and the landing. Hovercraft, which move on a cushion of air only a few meters over the surface, require one mishap roll every 10 minutes, but the actual rolls are less conducive to disaster.

The table below shows the chances of mishaps associated with varying wind speeds.

AIR VEHICLE MISHAP TABLE

Wind Speed	Aircraft Grav Vehicles	Hovercraft
0 kph	11+	12+
8 kph	9+	11+
16 kph	7+	10+
24 kph	5+	9+
32 kph	3+	8+
40 kph	1+	7+
48 kph	-1+	6+
56 kph	-3+	5+
64 kph	-5+	4+

Mishap throws are modified by vehicle skill in the appropriate vehicle type. These DMs do *not* require the averaging of Arctic Driver skill for aircraft or grav vehicles, though hovercraft do require this averaging as always.

A Mishap generally involves a loss of control. The character is given 1d combat rounds to correct the mishap (by additional throws – one per combat round – against the mishap number), or the vehicle will crash. A crash is not always fatal; on a throw of the operator's dexterity or less (DM - vehicle skill) the crash becomes a crash landing, reducing the chances of injury for all aboard. Exact damage values and chances are up to the referee to determine based on conditions, terrain, and other circumstances.

Movement rates for hovercraft and air vehicles is based on the standard movement rates given in the basic rules, but air vehicles flying below cloud cover are halved in speed, due to considerations of safety.

Snowmobiles: Snowmobiles are small vehicles especially designed for travel over snow and ice. Basic speed is up to 45 kph, though faster models capable of speeds in excess of 100 kph are available. Snowmobiles are subject to the usual procedures for vehicles with performance as shown on the movement effects chart.

Iceboats: Iceboats are vehicles designed for operation on large ice plains. They are, essentially, flat-bottomed sailboats fitted with runners to hold the ice. They are useless on anything but fairly level ice. Movement is by wind power; iceboats can move at a speed of 1d times the wind velocity when moving with the wind, or perhaps a quarter of that against the wind. Otherwise, they are treated as standard vehicles, with performance characteristics as given on the table.

Sleds: In arctic conditions animal-drawn sleds remain a primitive but fairly efficient form of transportation. Basic movement rate depends on the speed of the animals drawing it;

this can be determined by establishing the speed in *Traveller* animal encounter terms, from the list below:

- S1 = 6 kph (1 km per 10 minutes)
- S2 = 9 kph (1500 meters per 10 minutes)
- S3 = 12 kph (2 km per 10 minutes)
- S4 = 15 kph (2500 meters per 10 minutes)

Other considerations are as for standard vehicles, except that the endurance of the animals (measured by dividing the basic hits required to knock the animal out by 3) should be tracked, treating their movement as very heavy exertion. All endurance rules should be in effect for animals drawing sleds. Mishaps may include both damage to the vehicle and injury to the animals, again handled according to procedures outlined previously for people on foot.

SURVIVAL IN ARCTIC CONDITIONS

The rules that follow simulate the effects of exertion and of low temperatures on characters in the arctic environment.

Endurance and Exertion: The basic *Traveller* rules for endurance are quite sufficient for most purposes. Characters doing a great deal of cross-country travel, however, will be subject to fatigue much more often than those who operate starships or stay in an urban setting. And arctic conditions can be particularly strenuous.

For this reason, special rules for dealing with endurance and fatigue are needed. The referee should note that these same rules could be applied to almost any *Traveller* situation, if the realism and greater complexity seem worthwhile. Certainly any situation that involves wilderness travel would benefit from these additions.

Endurance: For the purposes of these rules, the basic *Traveller* endurance stat should be used and tracked in three separate ways. Each character should keep track separately of *Permanent Endurance, Basic Endurance,* and *Temporary Endurance.*

Permanent endurance is equivalent to the original endurance stat; it is reduced by injury and wounding, and recovered only through the standard process of healing.

Basic Endurance is used to chart a character's daily ability to function. Basic endurance is lowered by fatigue, and can only be recovered by sleep. It can never be higher than Permanent Endurance, but it can frequently be lower when a character's Basic Endurance is reduced to 0, that character is *exhausted,* and must sleep or suffer a loss of 1 point of permanent endurance.

Temporary Endurance is used to track a character's ability to exert himself over a short period of time. Temporary endurance is reduced by various types of exertion, and is recovered by rest. Basic endurance is always the upper limit for a character's temporary endurance value. When temporary endurance reaches 0, the character must rest; each time a character rests, it is necessary to check to see if basic endurance is reduced before the character may go on.

The process of tracking these three types of endurance is not as difficult as it may seem at first. Temporary endurance is the only stat that changes constantly and needs to be given regular attention; it is the guiding stat for the individual's current abilities. Basic endurance is only of concern at times when the character must determine his ability to push on after great exertion. Permanent endurance is of interest only at the start of a new day, or for purposes of recovery from a wound.

Exertion and Rest: Various tasks undertaken over the course of a day will weaken a character. Even light work can cause some loss of endurance, and the heavy exertions of hiking through deep snow can cause a rapid tiring. The exertion table shows some typical endurance costs for various activities, taken against temporary endurance on an hourly basis.

A character may recover temporary endurance by *resting.* A rest period of ten minutes recovers 1 point of temporary endurance. An hour's rest recovers 6 points. Temporary endurance cannot be raised to a higher level than basic endurance, regardless of how long a character rests.

If temporary endurance is reduced to 0, rest is mandatory; the character simply cannot go on. Should a single task be such that it will cause the character to go below 0 in temporary endurance, the character may still attempt the action. The referee secretly rolls 2d; if the roll is less than or equal to the *basic* endurance level, the character completes the task, ending with temporary endurance 0. Failure of the roll will result in an automatic *mishap* for the character in question.

When a character rests and then begins activity again, the referee should roll 2d and compare the result to the current temporary endurance value (as recovered by rest). If the roll is higher than the figure, basic endurance is reduced by one; successfully making the throw indicates that no loss is suffered to basic endurance.

A character may rest longer than would normally be required in order to recover temporary endurance to the basic endurance level. This is a special exception to the usual limit on temporary endurance. In order to make it less likely that basic endurance be lost a character that rests may raise temporary

endurance as high as desired (beyond the usual limits) by prolonged rest. *THIS IS USED ONLY WHEN CHECKING BASIC ENDURANCE LOSS...* after which temporary endurance reverts to its usual maximum level.

Fatigue and Sleep: As noted above, basic endurance is slowly reduced as a character travels. It is raised, in turn, by sleep.

Most characters, under normal conditions, need 8 hours of sleep. If a player wishes to argue about this (and it is true that many people can bet by with less), individual characters can be permitted lower sleep requirements, or be penalized with higher ones. The player should roll 2d, and compare the result to the Permanent endurance stat. A result of less than or equal to the stat allows a deduction of 1 hour to the required total, while greater results *add* 1 hour, instead. More than one roll may be made, if the player wants to push it, but each roll after the first receives a DM+2 to make successive rolls increasingly difficult to achieve.

Once the character's standard sleep needs have been determined, the figure will remain fairly constant. It is used to set the recovery rate for basic endurance points. When a character sleeps for the full indicated period, all lost basic endurance is recovered, to bring basic endurance up to the same level as permanent endurance upon awakening. Fractional periods of sleep lead to a fractional recovery of basic endurance. Thus, a character with a permanent endurance of A works all day and reduces basic endurance to 0; eight hours of sleep return the level to A, while 4 hours sleep recovers the level to a 5, instead. Fractions should always be rounded *up*.

A character whose basic endurance is reduced to 0 is fatigued, and must either sleep or make a throw less than or equal to permanent endurance. Success allows the character to add one point to basic endurance, but at the cost of a 1 - point "wound" against permanent endurance. This process can be repeated, with an increasing toll to the individual's health. Any time a fatigue roll is failed, the character falls asleep immediately, no matter what the current situation.

If a character sleeps longer than necessary, the only benefit received is the recovery of 1 point of fatigue damage (only) to permanent endurance per four hours of sleep over and above the required length.

Wounding: When a character is wounded, and suffers a loss of endurance, both permanent and temporary endurance levels are reduced by the amount of the wound. If *either* figure drops to 0 or below, the character will pass out. However, serious and fatal wounds only occur when permanent endurance (and one or two other stats) are reduced to 0. But a tired character is more likely to collapse as a result of an injury than a fresh, rested character.

Exertion and Air Pressure: The exertion table indicates that loss of temporary endurance will be more sever when characters are in atmospheres that are less dense than they are used to working in. The atmosphere a character is accustomed to should be determined (based on homeworld atmosphere type, if known, or designated by the referee). Pressures are Very Thin, Thin, Standard, or Dense (though no characters will be accustomed to Very Thin atmospheres). If an atmosphere is thinner than the character is accustomed to, the character suffers an extra exertion penalty, as shown on the table.

However, characters become acclimated to particular atmospheres over time. This takes any given character 2d days; DM-1 for strength 9+ or endurance (permanent) 9+. Obviously, natives of a world are already acclimated to its atmosphere.

See the *Mountain Environment* supplement for rules dealing with varying atmospheric pressures according to elevation.

Very Thin Atmospheres: It is possible, but by no means desirable, for characters to venture into very thin atmospheres without oxygen supplies. However, acclimation to very thin atmospheres is not possible for human beings. In addition to the usual penalties for exertion in lower pressures, 2 points of damage to permanent endurance is suffered for every hour spent without oxygen supplies. Once permanent endurance reaches 0, damage is then applied to strength at the same rate. Finally, when strength has reached 0, both dexterity *and* intelligence are reduced simultaneously (as oxygen-starved brain cells are affected). If either reaches 0, the character dies. Intelligence losses, unlike the others, are permanent.

As long as the character has an outside source of oxygen, these effects do not occur. Several characters can share a single oxygen source, but this will only slow, not eliminate, the damage. Trace and vacuum atmospheres cannot be breathed.

EXERTION TABLE

Activity	Endurance Loss Rate
Light Activity (L)	.25 points/hour
Heavy Activity (H)	.50 points/hour
Very Heavy Activity (V)	1.0 points/hour
Atmosphere 1 level thinner than accustomed	+1.0 points/hour
Atmosphere 2 levels thinner	+2.0 points/hour

Notes: Activities on the chart above should be those most applicable. Activities include not only travel (as given on the movement effects charts) but also other factors – setting up camp, hard labor, etc. would all be heavy activity, for instance.

Times are given in hours; most travel should be conducted in hourly periods. The next lowest scale used is generally in 10-minute time periods; if these are being used, average the difficulty of travel over the hour by adding individual difficulties for each 10-minute period and dividing by 6.

Encumbrance doubles the exertion rate. Modifiers are cumulative and constant.

Cold Weather Effects: Distinct from the problems of exertion and fatigue are those of low temperature effects on the human body. Low temperatures are extremely dangerous to life as we know it, and lack of proper protection can result in a quick and unpleasant death.

Determining Temperature: The apparent air temperature is determined from two sources – the local temperature established in a previous section, and the force of the wind. High winds can drop the apparent temperature by a great deal. Using the known factors of air temperature and wind velocity, the Wind Chill Table indicates the *apparent* air temperature. When base temperatures are much below -54°C or winds are over 64 kph, little additional effect is observed. It should be noted that this chart is only an approximate translation of the actual U.S. Army Wind Chill Table, and should not be considered as 100% accurate.

Effects of Low Temperature: Low temperatures sap body heat, causing a condition known as *hypothermia.* (Other effects, such as frostbite, are discussed in the next rules section). Hypothermia can kill a character.

Damage from low temperatures are handled as follows. A completely unprotected character will take one point of damage for every two degrees below O°C of apparent air temperature every hour. This damage is applied randomly against physical stats. Where temperatures get very low, it is best to shift to a shorter time scale.

Two major factors, exertion and protection modify this basic rate. Exertion enables the body to pump more heat, thus reducing the effects of cold. Heat losses are altered according to the schedule below.

- Sleep or Rest: Losses x 1
- Light Activity: Losses x .75
- Heavy Activity: Losses x .60
- Very Heavy Activity: Losses x .50

Obviously, activity is a good way to stave off the drop in stats, but the rules for endurance will cause prolonged exertion to eventually lead to an inability to continue this form of modification.

Protection comes from the use of clothing and shelter. Shelters block the wind, so even in the absence of a heat source, shelters do offer some improvement. With a small heater of some type, a shelter becomes a safe haven from the cold.

Clothing is rated as to the value of protection it provides. The protection rating for an item of clothing is the apparent temperature increase the clothes provide to the character. Thus, if the wind chill temperature is -15°C, clothes with a +15 protection rating makes the temperature equivalent to O°C, eliminating damage accumulation due to cold.

Protection ratings of a number of types of clothing are provided among the charts and tables in the appendix at the end of the supplement. This includes not only basic *Traveller* clothing and armor types, but also several new items introduced in the equipment chapter of this booklet.

Clothing may be worn in layers; up to four layers may be worn. However, each type of clothing is rated as being underclothing, clothing, overclothing, or outerclothing; only one of each may be worn. This limits the possible combinations of layered clothes.

Over-clothes and outer-clothes are considered to include protective gear for the head and the limbs; the other types do not include such protection (or, if they do, it is less effective than the garment's body protection). If limbs are not protected, damage is half again as high as normal; if the head is not protected, the loss is doubled. These areas of the body are the most important sources of heat loss in the human body.

Clothing which causes the apparent temperature to rise over 35°C for the character cannot be worn; this is too hot and uncomfortable, and danger from perspiration soaking clothes makes it necessary to reduce the amount of clothing to lower the apparent temperature below that point.

A character's Arctic Survival skill may always be added to the protection value of any clothing worn.

SPECIAL ARCTIC HAZARDS

In addition to the general problems discussed previously, certain special dangers are present in the arctic environment. These are discussed below.

Immersion: Characters who for any reason are soaked with water (by falling through thin ice, for instance) are in special danger from the arctic cold. While in the water, characters lose 1 point of damage every minute, due to rapid conduction of body heat. Ordinary clothing will not halt this loss; only an enclosed, self-contained outfit - a combat environment suit, vacc suit, a suit of sealed combat armor/battle dress, or a protective or heavy protective suit will continue to provide normal protection in the water.

Out of the water, clothing (except those types noted above) loses all protective value, and a wet character suffers a doubled damage rate until he or she can dry off and change to warm, dry clothes once more. Immersion is extremely dangerous in cold weather conditions.

Snow Blindness: Ice and snow are great reflectors of light and ultra violet, and can indeed reflect enough glare on a bright day to cause temporary or even permanent vision impairment for unprotected characters. This is especially true on worlds with brighter stars than our own.

Basically, characters exposed for more than a few seconds to the unscreened glare of sunlight on snow and ice must roll 2d. On a 5+, the character can see, but poorly; a -2 is applied to all surprise rolls for that character, and travel rates are multiplied by .75. On a 9+, the character suffers temporary blindness, being unable to see anything for 2d minutes, and then restricted by the procedures for 5+ for another Id hours afterwards, even out of the glare. On a 12+, the character suffers severe damage, blinding the character until medical treatment (as for a "serious wound") becomes available. On a 15+, the damage is permanent, barring bionic or organ transplant surgery.

If GDW Book 6, *Scouts* is in use, the classification of the star can have some effect on the throw. DM-3 for class MO or lower; DM-2 for class K5-K9; DM-1 for class KO-K4, DM+2. Brighter stars receive a DM+4. Brightness is affected by distance; a world in the star's "inner zone" has a DM+1; the habitable zone receives no DM, while outer zone worlds have a DM-2.

Characters can wear polarized goggles or other protective equipment, as discussed in the equipment section.

Frostbite: In addition to hypothermia, low temperatures may cause frostbite, freezing of exposed flesh. The wind chill table regulates the chances of frostbite. Three zones are delineated on the tale, labeled "safe", "danger," and "great danger."

The safe zone offers little chance of frostbite. Roll once every 10 minutes; frostbite is suffered on a roll of 12+, DM-1 if the apparent temperatures is over 0°C.

In the "danger" zone, one roll is made every minute, with frostbite occurring on a roll of 8+. Arctic survival skill is a negative DM.

In the "great danger" zone, roll once every 30 seconds, with a 5+ indicating frostbite. Arctic survival skill is a negative DM.

Frostbite rolls are made only when the character directly exposes skin to the air, or when the protection factor of all available clothing is less than 5. When frostbite occurs, 1 point of damage is suffered. Of every 3 points of frostbite damage inflicted, one point is permanent.

Visibility: Visibility can sometimes be a problem in arctic conditions. Reduced visibility comes about in periods of moderate, heavy, or blizzard snowfall, or when high winds kick up snow on the ground. The visibility table is used to determine the maximum sighting range under various conditions. Roll 2d, and apply modifiers as given below the table.

ARCTIC VISIBILITY

Die Roll	Sighting Range (Laser Effectiveness)	
0	Whiteout!	(-4)*
1	Short	(-3)
2	Short	(-3)
3	Medium	(-2)
4	Medium	(-2)
5	Medium	(-2)
6	Medium	(-2)
7	Long	(-1)
8	Long	(-1)
9	Long	(-1)
10	Very Long	(0)
11	Very Long	(0)
12	Very Long	(0)
13	Very Long	(0)
14	Very Long	(0)

Modifiers
DM+2 for wet snow cover
DM+2 for hardpack snow
DM=0 for moderate, intermittent storms
DM-1 for moderate, steady storms
DM-2 for heavy, intermittent storms
DM-3 for heavy, steady storms
DM-4 for blizzards
DM+1 for 0 kph wind
DM=0 for 8 kph wind
DM-1 for 16 kph wind
DM-2 for 24-32 kph wind
DM-3 for 40-48 kph wind
DM-4 for 56-64 kph wind
* For whiteout, see Special Encounters and Events.

Laser Weapons: The visibility table gives DMs to be applied to attacks using laser weapons under various visibility conditions. These DMs are applied to attacks at any range. Snow crystals kicked up by wind or falling in a storm will tend to diffuse the beam from any laser weapon.

SURVIVAL TECHNIQUES

Characters in the arctic are subjected to the most difficult of all survival conditions. Some special points must be considered in arctic survival situations.

Improvised Shelter: Shelters of varying quality and effectiveness can be built by hand.

Emergency Shelter: An emergency shelter can be built by digging a hole in snow; the sides of the hole screen out winds, but do not protect from other elements. Such a shelter requires at least a deep snow covering; if it is to be dug in hardpack snow, tools are required (shovels or picks, or improvised tools approximating these), or the time to excavate is tripled.

An emergency shelter takes 10 minutes for one person to dig (per person to be sheltered; one person digging a shelter for 3,would take 30 minutes). A shelter of this type of shelter blocks all wind chill effects, and protects a fire from wind - but provides no additional shelter.

Temporary Shelter: A temporary shelter can be built in a deep snowdrift (only). These can be found in any area of deep new snow on a roll of 9+, made once per ten-minute period. A temporary shelter takes 30 minutes for one person to excavate per person to be protected.

Temporary shelters are enclosed, protected from both wind and elements. A heat source within will raise the inside temperature to safe levels for characters to make clothing changes and rest without fear of freezing to death. Only characters with arctic survival -2+ skill can excavate these shelters.

Permanent Shelter: Permanent shelters can be constructed from ice blocks. Such shelters are difficult to build, taking 52 man-hours per person to be accommodated. Only characters with arctic survival skill -4+ can build shelters of this type. Permanent shelters have the same features as temporary shelters. Temporary shelters, however, last only 12-24 hours, while permanent shelters last as long as the temperature remains below freezing.

Permanent shelter construction requires tools for shaping blocks of ice; without such tools, they cannot be built.

Where snow and ice are not present, shelters can be improvised out of rocks, dirt, or vegetation, taking roughly equivalent lengths of time, but generally requiring more tools to build.

Food: Hunting for food in the arctic environment is somewhat more difficult than in other wilderness situations. When designing animal encounter tables, the referee should make the basic chance of an encounter significantly lower than usual, particularly in arctic and subarctic regions. However, characters with Arctic Survival skill should be permitted to average this skill level with Hunting skill (all characters may be considered to have Hunting-O in the absence of other skill) and apply this as a modifier to finding animals in the subzero wilderness; apply the averaged skill as a DM to the animal encounter probability roll.

Characters on temporary or pack ice may cut a hole in the ice (requiring the character to inflict 1dx20 damage points in the ice with blades, polearms, energy weapons, or explosives), or find an opening in the ice (a polnya – see the Special Encounters and Events chapter). When such a hole is available, they may attempt to catch aquatic wildlife. A catch is made in any given ten-minute period on a roll of 9+.

Water: It may seem strange, but water may be hard to obtain in the arctic. A heat source is necessary to melt snow or ice; lacking a heat source, water may not be so easy to reach. If a frozen pond, lake, stream or river is found, a hole can be cut through the ice (see above) to obtain fresh water, but this is the only way to reach water without a heat source.

Snow can be melted with body heat, but a liter of water obtained in this fashion inflicts one point of damage on the character by increasing the rate of heat loss.

Where fuel is limited for heating water, snow uses 50% more fuel than ice to gain the same quantity of water. Gathering ice, however, is considered very heavy labor, requiring 10 minutes of exertion per liter gathered. Exact times and fuel amounts used will vary with conditions; the referee should use common sense in regulating these matters.

Fires and Heat: Fires cannot be set if exposed directly to winds of over 16 kph; an emergency shelter, however, can protect the fire (as can other improvised barriers). Fuel for fires can be obtained from wood or from animal fat; arctic survival-1 is required to utilize animal fat as a fuel source.

Fires and other sources of heat are ineffective as a method of warming characters more than slightly unless used within a fully enclosed shelter.

Direction Finding: Characters in Polar Regions of worlds with a significant axial tilt cannot use magnetic compasses for direction finding. Worlds with an axial tilt have the magnetic poles displaced from the location of the true poles. Inertial locators are not affected by this problem.

Improvised Clothing: It is possible for characters to make primitive protective clothing (boots, pants, hooded coat, mittens, and facemask) from sewn animal pelts. One suit will require pelts from a total of 800 kg of animals (any combination of individual weights will do) properly dressed, and sewn together. Exclusive of hunting time, this requires one person two days to complete. One day of this time is spent in curing the hides, and other activities may be undertaken on the same day. Cutting, fitting, and sewing the garment will take one full day, and these tasks cannot be undertaken on the move. The resulting clothes are considered to be Type I Cold Weather Clothing, and are generally overclothes.

Equipment

A wide variety of equipment and gear is available for use in the arctic environment. Many of these items are discussed below.

COLD WEATHER GEAR

The following protective garments are available.

Cold Weather Clothing, Type I: Available in two versions, this is relatively primitive protective gear manufactured at tech levels 1-6. The specific versions are discussed below.

Undergarments: Consists of simple, heavy woven "long johns." No protection for head or extremities (hands or feet) is provided. Costs Cr 25; protection as given on the Clothing table. Weight is negligible.

Overclothing: Consists of boots, pants, hooded parka, facemask, and gloves or mittens. Protection for extremities is provided. The gear is designed as overclothing, but a larger size can be worn as an additional outer layer; an outerclothing layer provides extra warmth because of the benefits of layering in retaining heat. Outerclothes can be worn only in addition to (not instead of) overclothes. Protection values are shown on the table. Cost is Cr 200. Weight is 2 kg.

Cold Weather Clothing, Type II: Available at tech levels 7-9, type II gear makes use of synthetic fabrics and superior manufacturing techniques to provide greater efficiency, as shown on the table. Types available are as type I, but undergarments cost Cr 50 and overclothes/outerclothes cost Cr 500, with 1 kg weight.

Cold Weather Clothing, Type III: As previous types, but available at tech levels 10+. This type of gear uses advanced fabrics for lighter weight and superior protection. Available in the same configurations, but underclothing costs Cr 100, and overclothes/outerclothes cost Cr 800. All gear has negligible weight.

Shelter Suit: A loose-fitting garment with facemask, gloves, and hood which can be used with a battery-operated heat pump to provide protection from all but the most extreme conditions of heat and cold. Weight is negligible; available at tech level 9+, at a cost of Cr 800.

Heat Pump: Used with sheltersuit, above. When activated, the self-contained battery provides 720 hours of operation. During this time, the protection value can be set from 10 to 10, as the character desires. The heat pump can also be used to heat a small tent or shelter, but at triple the power drain (1 hour operation reduces remaining available hours by 3). Recharge of the battery is possible from any standard power source, taking 1 hour for 10 hours recharge. Weight is 2 kg; available at tech level 9+ at a cost of Cr 250.

Catalytic Heater: A small chemical heat source, commonly worn inside layers of overclothing, to supplement body heat. Catalytic heaters of this type are of negligible weight, and cost Cr 20 apiece; the heat augmentation provided lasts 6 hours, after which the heater is disposed of. Catalytic heaters are available at tech level 8+.

TRANSPORTATION

The following are available devices for personal transportation in arctic conditions.

Skis: Basic skis measure from 1500 to 2200 millimeters, and are available at all tech levels. Price is Cr 5 to Cr 50; the exact price determines reliability (see below). Weight varies with tech level; tech level 0-5, weight is 4 kg per pair; tech 6-10, weight is 3 kg per pair; tech 11+, 2 kg per pair. Skis are considered to include bindings.

Reliability: The reliability of a pair of skis depends on price; the multiples of Cr 5 (from I to 10) of the price set the basic reliability. The skills of the skier are added to the reliability; when a mishap occurs, roll 2d-2, and compare the numbers. If the roll is less than reliability plus skill, the skis do not break; a roll greater than or equal to the figure results in breakage.

Skis of tech level 6+ should have an additional +2 added to reliability, to reflect superior materials.

A ski can be used as an awkward cudgel (cudgel-1) in combat; roll against reliability after each hit to determine if the ski is damaged.

Ski Boots: Special boots are generally required for skiing, designed to give added support to the foot while skis are used. For cross-country skiing (the only kind discussed here), the boot is light and low-cut. Weight is 1 kg, and price is Cr 30. They are available at any tech level.

Ski Poles: Poles are necessary for propulsion on snow. Measuring 1250 millimeters in length, and weighing 500 grams each (on the average), poles cost Cr 10 per pair. Each

pole can, if need be, used as spear-2 in combat. They are available at any tech level.

Accessory Kit: Skiers require a small accessory kit, weighing 1 kg, containing wax and an applicator, a small repair kit, and so forth. The kit does not permit repair of broken skis; it is for minor maintenance work. Without the kit, skis decline in reliability by one level per day of use, until a Kit becomes available. The repair kit is available at tech level 3 and up, and costs Cr 10. The kit must be replaced after ever 15 days of ski use.

Snowshoes: Typical snowshoes measure 250 millimeters wide by 1000 millimeters long. Other statistics vary with tech level, as discussed below.

- ***Tech Level 0-5 Snowshoes*** weigh 2 kg, and cost Cr 50 per pair.
- ***Tech Level 6-7 Snowshoes*** weigh 1.5 kg and cost Cr 100 per pair.
- ***Tech Level 8+ Snowshoes*** weigh 1 kg and cost Cr 125 per pair. These snowshoes are somewhat more flexible than other models; add 1 to the basic mishap number given on the Movement Effects table.

Use of a ski pole or other aid to walking also adds 1 to the mishap number with snowshoes.

Primitive Ice Skates: Crude ice skates are generally manufactured with runners of bone or wood, or possibly with poor metal. They are available at Tech Levels 1-4, weigh 2.5 kg per pair, and cost Cr 75. A new edge must be put on skates of this type once each day, which requires an hour's work. Failure to do this causes a DM+3 on all mishap die rolls.

Ice Skates: Standard ice skates have metal runners, and are available at tech levels of 4+. They weigh 1.5 kg per pair, and cost Cr 50. Edges last a week between sharpening, and the mishap DM for failure to sharpen runners is only DM+1.

Stabilized Ice Skates: An advanced type of ice skate, these incorporate principles of gyroscopic stabilization and negative feedback to aid the skater in staying upright. The skates are available at tech level 10+, weigh 3 kg per pair, and cost Cr 250. They share maintenance characteristics *if* with standard skates. In addition, the stabilization/feedback principle increases a character's skating skill by two levels, even if the character is otherwise unskilled.

SNOWMOBILES AND ACCESSORIES

Light Snowmobile: The Light Snowmobile is a small, one-man snowmobile. The driver stands at the rear of the vehicle, gripping the controls. The vehicle uses a centrally mounted rear track and two ski runners forward for support and drive. Two models are available, as 'shown below.

Internal Combustion Light Snowmobile: Tech Levels 8-9. Weight, 250 kg. Maximum speed, 25 kph. Cost, Cr 750. Range, 125 kilometers between refueling.

Fusion Light Snowmobile: Tech Levels 10+. Weight, 110 kg. Maximum speed, 30 kph. Cost, Cr 45000.Range, 2500 kilometers between refueling.

Snowmobile: This is the standard snowmobile design, which is larger and more robust than the light model. Seating for up to three individuals is available on a simple saddle arrangement. Again, two models are available.

Internal combustion Snowmobile: Tech Levels 5-9. Weight, 500 kg. Maximum speed, 55 kph. Cost, Cr 1200. Range, 125 kilometers between refueling.

Fusion Snowmobile: Tech Levels 9+. Weight, 600 kg. Maximum speed, 60 kph. Cost, Cr 75,000. Range, 5000 kilometers between refueling.

Racing Snowmobile: An expensive but ultra-fast version, the racing snowmobile is essentially similar to the standard snowmobile, except in size and power of the engine.

Internal Combustion Racer: Tech Levels 6-9. Weight, 750 kg. Maximum speed, 110 kph. Cost, Cr 1800. Range, 100 kilometers between refueling.

Fusion Racer: Tech Levels 10+. Weight, 750 kg. Maximum speed, 125 kph. Cost, Cr 100,000. Range, 2500 kilometers between refueling.

Wheel Kit: An adapter kit permitting retractable wheels to be mounted on snowmobiles and snowmobile trailers. Available at tech levels 8+, these wheels allow the snowmobile to be used in the absence of snow cover. Weight is 10 kg, cost is Cr 80. Maximum vehicle speed is roughly equivalent to standard snow speeds.

Float Kit: An adapter kit that permits the vehicle to operate in water, containing pontoon floats and a propeller that can be connected to the drive track. This kit weighs 50 kg, costs Cr 100, and is available at tech level 8+. Water Speed is 1/10 the land speed.

Cargo Trailer: A sled designed to carry up to 500 kg of cargo. Weight is 300 kg, cost is Cr 150. Tech level 6+. A loaded trailer reduces basic

Passenger Trailer: A sled designed to carry up to four characters. Weight is 300 kg, cost is Cr 150, tech level 6+. Reduces speed to .75 times the basic value.

Combination Trailer: A sled designed to hold 250 kg of cargo and one passenger. Specifications as above. It should be noted that a chain of trailers can be towed, of any variety. One reduces speed to .75, two to .5, and 3 to .25. Four cannot be towed. Trailers can be fitted with wheel or float kits.

Driver Cab: A cockpit-type canopy that can be attached to most snowmobiles and passenger trailers. Weighing 100 kg, costing Cr 250, and available at tech levels 7+, the cab provides protection from the elements, and can be heated. For an additional Cr 250, canopies can be pressurized, permitting operation in unbreathable atmospheres.

VEHICLES AND ACCESSORIES

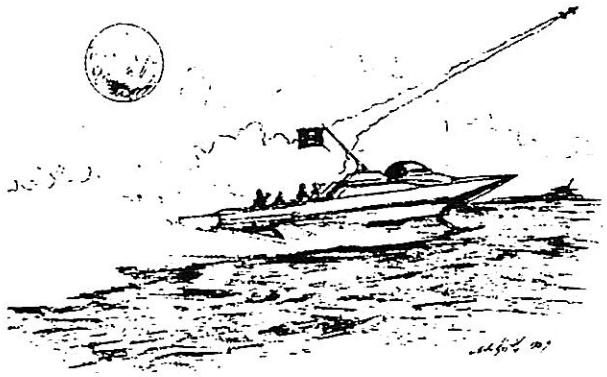
Arctic Wheel Adapters: This is a general category including special snow tires, chains, and other devices that can improve traction. Wheeled vehicles using these methods raise snow performance to a 1/.75/.1 level, and ice performance to .5. The mishap number is also increased by 1.

Tech Level 5+; weight, 50 kg per wheel; cost, Cr 100 per wheel. (Referee should establish number of wheels per vehicle).

Engine Heater: A heater designed to protect an engine from freezing. Use of the heater requires a power source (other than the vehicle), such as a generator or a building power supply. Weight is 10 kg, tech level 6+, price Cr 40.

Portable Engine Heater: A battery powered version of the standard engine heater. Weight, 15 kg; tech level 9+; price, Cr 100. Lasts 100 hours before recharge from any standard power source.

Jumper Cables: Simple cables designed to permit an engine to be started using another vehicle, in place of a dead battery. Weight, 1kg, tech level 5+, price Cr 10. Lengths available are 2 meters, 5 meters, and 10 meters.



"Scooter" Iceboat: A small iceboat, designed for operation on both ice and water. Length is 5 meters; beam is 1.8 meters. Weight is 1 ton. Crew is 2-5 people (minimum 2; 200 kg cargo allowed in place of each other crewman omitted). Mast height is 6 meters, with 25 meters of sail area. The scooter costs Cr 1000.

Medium Iceboat: Medium-sized iceboats operate on ice only. Length is 10 meters, beam is 3.6 meters, and weight is 4 tons. A crew of 8-20 may be carried. Mast height is 12 meters, with a sail area of 120 meters. Cost is Cr 2500.

Large Iceboat: Like the medium craft, these are generally limited to ice only. Length is 2 meters, beam is 7 meters, and weight is 10 tons. A crew of 25 is required (five of them with minimum skill of iceboat-1); up to 60 other people (or 200 kg cargo per person deducted) can also be carried. Mast height is 25 meters, and sail area is 375 meters. Cost is Cr 7500.

Note: It is theoretically possible for other iceboat types to be converted to in-water use; it is also possible for even larger iceboats to be constructed. In general, though, such craft would not be commercially available, having limited utility except on primitive and ice-bound worlds.

Sled: Animal sleds vary from world to world, depending on the nature of individual cultures and the animals used to pull the sled. The familiar dogsled of Earth arctic lore is but one of many possibilities.

On an average, animal-drawn sleds are pulled by at least 200 kg worth of animals; several small beasts may be used, or fewer, larger animals. A sled animal of less than 25 kg will be rare and most such animals will be given a *Traveller* speed of S2 or S3 (though other speeds are not beyond the realm of possibility).

A typical sled design is for a vehicle carrying a driver and a cargo area capable of holding two people or 500 kg of cargo. It measures 2 meters in length, is available at tech level 1+, and weighs 150 kg. Cost is Cr 500.

However, many other sled designs are possible. The referee may adapt specific designs based on this information; the sled should be capable of carrying cargo or passengers weighing four times the weight of the sled. The weight of the total animal team should exceed the weight of the sled. Sled cost should equal cargo capacity.

Trained sled animals are valuable on any world; they are worth, on an average, Cr 10 per kilogram each, and take at least a year to train. Animal training requires Sled-4 skill on the part of the trainer.

The referee should feel free to introduce additional variations and possibilities, especially among primitive cultures that flourish in cold climates.

GENERAL EQUIPMENT

The items that follow are general pieces of equipment that may be of interest.

Goggles: Polarized goggles, available at tech level 5+, eliminate the danger from glare (discussed in a previous section). Weight is negligible; cost is Cr 10 per pair. If worn indoors or in darkness, inflict a Dexterity-2.

Self-Polarizing Goggles: Similar to basic goggles, these adjust automatically to the amount of light being received. No penalty is applied to indoor or darkness use. Weight is negligible, cost is Cr 50 per pair.

Coated Lenses (HG Configuration): High-Glare Contact Lenses are worn like ordinary contacts, but reduce the glare from snow and ice reflection almost as effectively as goggles. They offer the advantages of being inconspicuous and added security (loss of goggles doesn't mean a chance of snow blindness, if contacts are worn). Cost is Cr 150, weight is negligible. Available at tech level 8.

Propane Heater: Available at tech level 5, the propane heater uses bottled gas to provide heat in a small, enclosed area. One tank of gas provides 6 hours of heating. Heater weighs 3 kg, and costs Cr 75. Each tank of gas weighs .5 kg and costs Cr 10.

Battery Heater: Available at tech level 7, this heater is a small, self-contained battery-operated electric heater. A battery charge lasts 36 hours; it requires access to a standard power source. Heater weighs 4 kg and costs Cr 125.

SECTION II: ENCOUNTERS

Special Encounters and Events

On the pages that follow, some suggestions for potential events for inclusion in arctic encounter tables are presented. No actual tables are presented here; rather, these individual events are intended for insertion into standard pre-generated or referee-created tables, to lend variety and flavor to an adventure or campaign set in subzero conditions. The suggested events are by no means definitive, and referees are urged to add others as they see fit.

Each event is given a name, followed by the types of terrain/snow cover the event is most likely to occur in. A description of the event, its possible effects, and die rolls to trigger or avoid the situation, are all included in the text that follows the event name.

ENVIRONMENTAL ENCOUNTERS

Whiteout: Whiteout (any terrain/deep snow) is a condition which occurs when ground and sky are both so white as to be indistinct from one another, and visibility drops to Close range. Periods of whiteout generally accompany heavy storms, but can also be a result of high winds picking up fallen snow. In whiteout conditions, it is not possible to see far enough to move safely; both vehicles and individuals on foot must stop until the effects end (generally in 1d-1 hours; if 0, roll 1d x 10 minutes for duration instead).

Avalanche: Avalanches (rugged terrain/deep snow) are caused when large masses of snow are dislodged from mountainsides to flow like a tidal wave into the valleys below. Actually, there are several distinct types of avalanche, each discussed below.

Wet Avalanche: Wet avalanches generally occur when temperatures rise over O°C when deep snow covers the mountainsides; the melting snow loses adhesion, and slides. Wet avalanches move at speeds of 90-100 kph. Wet avalanches can carry destruction for as much as 3 kilometers before losing momentum.

In a wet avalanche zone, a roll of 10+, made once every 10 minutes, triggers the avalanche. A DM-1 is applied if there is no sunlight; a DM+2 is applied for the presence of loud noises, including shouting, gunshots, explosions, etc. If an avalanche is present, characters caught in it (i.e. failing to outrun it) must roll dexterity or less (DM-arctic survival skill) to avoid immediate death. If they survive, roll dexterity or less a second time (with no DM) to stay on the surface. Failure results in entrapment in a snow pocket. The referee is responsible for judging the depth of such burials and the chances for escape or rescue.

Dry Avalanche: Dry avalanches are caused by excessive accumulations of snow. They move at speeds of up to 175 kph, and can carry 5 kilometers or more.

The effects of a dry avalanche are as above, but the DMs applied to trigger it are different. A DM+1 is applied for a snow accumulation of more than 20 centimeters, and a DM+3 for loud noises. The throw is still 10+, with rolls made every 10 minutes.

"White Death:" The "white death" is an extremely rare form of avalanche, a variant of the dry type. It occurs when a fine powder of snow is involved in an avalanche. A deadly dust cloud of fine snow suffocates individuals in the path of this form of avalanche. A white death avalanche inflicts 1d x 10 damage points on every character. If the damage is insufficient to kill the character, it "heals" immediately.

Other Considerations: A vehicle caught by an avalanche will be buried automatically, and will form an air pocket for characters inside. All characters within should roll strength or less to avoid 2d damage from the buffeting received as a result.

Characters will generally lose all equipment, as the first rule of thumb for avalanche survival is to jettison skis, backpacks, etc.

Pressure Ridge: A pressure ridge (shelf or pack ice terrain/any snow cover) is a place where uneven freezing has created a long, fairly straight ridge of higher ice projecting above an otherwise fairly level plain. As water froze into ice, pressure would force water together, and upward; if the freezing process were at all rapid, this upward thrust of water would be preserved as a pressure ridge several meters in height.

Vehicles cannot cross pressure ridges. Individuals can climb over them; use the techniques of *The Mountain Environment* for particularly tall obstacles, if desired. Vehicles may detour around. Once a pressure ridge is encountered,

paralleling it, rolling once a day for a result of 11+ can discover the end of it.

A group may also choose to break a hole through the ridge. This requires the infliction of damage, using energy weapons or explosives; Id x 10,000 damage points must be inflicted to open a breach wide enough for a typical vehicle. Damage can also be inflicted by heavy labor. For each point' of strength available to characters engaged in an hour of Very Heavy Activity, one damage point is inflicted. Vehicles can be used to pull loose chunks of ice; the "strength" of such vehicles is rated as being equal to their speed in kph. Vehicle operators are engaged in Light Activity; the vehicles themselves do not tire, of course. With these methods, an excavation can eventually be made to permit the passage of a party's vehicles.

The referee may freely designate the work as being less difficult (especially where the group has nothing but fairly light vehicles), or can designate the whole task as being completely impossible. Hovercraft are blocked by ice pressure ridges; grav vehicles and aircraft, of course, have no problems in flying over such obstacles.

Polynya: A polynya (temporary or pack ice/ any snow cover) is a gap in the ice, sometimes open water, and sometimes slightly covered by a thin layer of ice. Polynyas provide open access to water below, which allows fishing, water collection (generally only in fresh water, unless the characters have desalination equipment to purify salt water), or even arctic diving. See the rules on arctic survival, and the Gamelords supplement *The Undersea Environment,* for details on these aspects of polynyas.

Rockfall: Like avalanches, rockfalls (rugged/any snow cover) are characteristic of mountain country. The thawing out of snow and ice causes rockfalls that binds loose rocks together. Rocks of varying size may occasionally plunge down from above. Probably the best way to simulate a rockfall situation would be to roll 1d to determine the number of dice damage a character will suffer if hit by a rock. The character should be permitted a throw of dexterity or less to dodge a rockfall; if the character fails the throw, the rock hits on a roll of 8+ and inflicts the previously established amount of damage.

Suncups: Suncups (any terrain/shallow snow cover) are irregular depressions in ice or snow. They are formed by uneven patterns of melting when the surface is exposed to sunlight. Movement through an area indicated as containing suncups will be at 2/3 the normal rate of travel. Skiers and snowmobilers should have a DM+1 added to all mishap throws.

Iceberg: An iceberg (pack ice terrain/any snow cover) is a mountain of ice which breaks free of surrounding pack ice. Characters who find themselves on icebergs for any reason (such as a crash or shipwreck) are advised to seek out low, flat bergs; pinnacled icebergs, constantly melting from below, are much less stable.

Basically, characters on bergs should check once each day for the effects of melting. Roll 2d; on a 12+, the berg shifts, dumping any passengers who may be present into the sea. On pinnacled bergs, a DM+2 is applied to the roll.

Quicksand: It seems incredible, but tundra regions (tundra terrain/spotty snow cover) are quite likely to support quicksand (which is usually thought of in connection with jungle, rather than arctic, terrain). Glacial streams from melting snow create sandbars that are saturated with water. Characters who enter into such areas will avoid becoming mired on a roll of intelligence or less (DM-arctic survival skill). If the roll is failed, the character is trapped in quicksand on a roll of 6+; only a single throw is made (quicksand patches are reasonably small).

Contrary to popular belief, quicksand is not impossible to get free of, and does not actually drag a character under. However, characters must avoid panic and maintain control. Roll intelligence or less to control panic, with one roll being made each combat round. Rolls are made until the character is rescued, or until the individual's thrashing about causes sinking and drowning.

Each round, a character may either sink deeper, or maintain position, or get free. First, attempts to get free may be made. Both the character and would-be rescuers can make separate attempts to get loose. The character must not be panicked to make the attempt; a roll of dexterity or less permits the character to get the necessary leverage; a throw of strength or less actually frees the characters. Rescuers must apply a number of strength points to hauling a fastened line equal to the victim's strength plus endurance. A roll of 8+ will then free the character; on a roll of 5- on the same throw, one of the rescuers (selected randomly) must roll dexterity or less to avoid being pulled accidentally into the quicksand beside the victim.

Once rescue attempts have been made, the victim must determine the chances of sinking. A character remains above the quicksand level for a number of rounds at least equal to temporary endurance. Actually, the temporary endurance is reduced by one for each round in which a saving throw is failed (the character sinks deeper, but is not otherwise reduced).

Each round, throw 7+ to avoid sinking deeper. A DM-1 is applied for each failed escape attempt that round, and a DM-2 is applied if the character has lost control this round.

Should the number reach 0 before a rescue is achieved, the character will drown in the next combat round. Characters pulled out of quicksand are immersed, and, when they come out, suffer the endurance losses recorded during the struggle.

Thin Ice: Ice (temporary or pack ice/any snow cover) does not freeze or melt uniformly, and a perfectly solid looking stretch of ice can be, in fact, dangerously thin. Weight put on thin ice can cause it to break, dropping the hapless victim into the icy water below.

When a thin ice event is introduced, roll on the thin ice table to determine the exact danger. Results can range from an inability to support heavy vehicles to breakage under the comparatively meager weight of a character. The results should remain secret; characters may not be certain just how much weight a thin patch of ice can bear.

When thin ice occurs, the lead character in a party (or the driver of a vehicle) should make a throw, as indicated on the thin ice table (Dm+ Arctic Survival skill), to notice the danger and avoid it. If the throw is not made, the characters are not aware that the ice offers any sort of danger. Should they make the throw, they will be aware of the potential danger, but not of just how much the ice can support.

THIN ICE TABLE

Die Roll	Situation	Saving Throw
2	Very Thin Limit: 50 kg.(Automatic)	6+
3	Thin Limit: 100 kg. (One Individual)	7+
4	Thin Limit: 200 kg. (Two Individuals)	8+
5	Thin Limit: 200 kg. (Two Individuals)	8+
6	Thin Limit: 200 kg. (Two Individuals)	8+
7	Moderate Limit: 500 kb. (Party)	9+
8	Moderate Limit: 500 kg. (Party)	9+
9	Moderate Limit: 500 kg. (Party)	9+
10	Moderate Limit: 500 kg. (Party)	9+
11	Thick Limit: 2 tons (Vehicle)	10+
12	Thick Limit: 2 tons (Vehicle)	10+

Thin Ice Effects: The weight limits (and the parenthetical interpretation of these, in terms of people and vehicles) on the thin ice table are used to establish the likelihood of the ice failing. If weight in excess of the indicated amount is placed on the ice (or, if the referee prefers, the number of people indicated are crossing), the ice gives way on a roll of 6+. If less than the indicated amounts make the attempt, the roll is 11+.

Automatic means that any character will automatically break the ice, with no die roll being needed.

Party refers to a group of ten or fewer individuals; since they are considered to be spread out, the number of individuals is in excess of the actual weight allowed. A vehicle of that weight, however, would have the potential of breaking the ice.

Breaking Ice: When a character or characters, or a vehicle, go out onto thin ice and a break occurs, the characters will have some warning. In a vehicle, no avoidance is possible; the reaction time is simply not fast enough. Characters not in vehicles can make a saving throw of dexterity or less to avoid the sudden collapse of the ice underfoot. If the roll is not made, the character falls through, becoming immersed in the water. A DM-Arctic Survival skill is allowed to the saving throw.

Ice Rescues: A character may make one attempt to escape from the water every combat round on his or her own. A roll of dexterity or less is required to gain a purchase; a roll of strength or less allows a character that has gained the needed leverage to get out of the water. A DM+1 is applied each. round (the DM is cumulative; after four rounds, the DM is +4), to represent the cumulative effects of soaking clothing and rapid fatigue.

Other characters can attempt to rescue a victim in the water. If a rope or other support can be given to the waterlogged character, it requires strength points equal to the sum of the victim's strength + endurance to attempt to haul the individual out; a roll of 8+ will get the victim out of the water. Rescuers must roll for possible ice breakage each round, as they risk further danger in their attempts to accomplish the rescue.

Characters that fall through the ice are subject to the effects of immersion (see the section on special arctic hazards). Vehicles that fall through the ice will sink, unless they are designed to operate in the water as well as the land. Characters aboard such vehicles may escape before it sinks (in 2d rounds from the time of the accident), but they will escape into the water, and be subject to the same problems as outlined above. (Because of the dangers involved, arctic expeditions are well advised to use more than one vehicle, so that the party doesn't have "all its eggs in one basket").

Obviously, vehicles are only affected by thin ice if they place their weight on the ice. Hovercraft, grav vehicles, and aircraft are in danger only when they land on bad patches of ice.

Drift: Snow (any terrain/deep snow cover) is not evenly distributed over the ground; it collects in depressions, and is blown into dunes and drifts by wind patterns. Snowdrifts can cause anything from a mild inconvenience to a person on foot to a major problem for vehicles.

When the referee determines that a drift occurs, a roll is made on the Snowdrift Table to develop the exact nature of the drift. This throw indicates the general nature of the drift, and the chance that it will affect either vehicles or individuals.

A vehicle that is affected by a drift may become bogged down. A roll of 7+ indicates that a vehicle has become stuck, with the following DMs applied: Weight/displacement of vehicle less than 1 ton, DM-3. Weight greater than 5 tons, DM+2. Vehicle is wheeled, without arctic tires, DM+3. Vehicle is wheeled, with arctic tires, DM+2. Vehicle is tracked, DM+1. Vehicle is snowmobile, no DM. Hovercraft and grav vehicles are not affected by drifts.

A trapped vehicle must be freed by being hauled free. Characters must apply 1 strength point for every 50 kg of vehicle weight; thus, a character with strength 10 could, by appropriate pushing and pulling, get a 500 kg vehicle out of a drift. One character must drive the vehicle, in addition to those who apply strength to pushing.

If other vehicles are available, count the maximum kph speed figure as the "strength" of the vehicle, and apply it the same way. Animals have a "strength" equal to half of the hits needed to render the animal unconscious in combat. Any combination of these methods can be applied to attempts to free the vehicle from the drift.

Characters who are affected by the drift may suffer from one of several drift effects. These are shown on the Snowdrift Table, and explained below.

SNOWDRIFT TABLE

Die Roll	Drift Nature	Vehicle Danger	Character Danger	Accident Type
2	Very Deep	5+	6+	Detour
3	Deep	7+	8+	Movement
4	Depression	7+	4+	Fall
5	Deep	7+	8+	Movement
6	Shallow	9+	10+	-1 TE
7	Shallow	9+	10+	-1 TE
8	Shallow	9+	10+	-1 TE
9	Deep	7+	8+	Movement
10	Depression	7+	4+	Fall
11	Deep	7+	8+	Movement
12	Very Deep	5+	6+	Detour

Detour: Character cannot cross the drift. It takes 1d-3x10 minutes longer to find a way around the drift; 0 or less indicates that no significant amount of time is spent in this detour.

Movement: The character's movement for the next hour is reduced by 1/2. This represents the problems of going through or around a whole series of deep drifts.

Fall: The character may fall as a result of uncertain footing in a depression filled in by snow. Roll dexterity or less to avoid a fall, which inflicts 1d damage.

-1 TE: The character immediately suffers an additional -1 to temporary endurance, as a result of the tougher going of the drift area. If movement is halved for the next hour, the penalty is eliminated.

Characters on skis and snowshoes can make use of a DM-2 on the character danger throw for snowdrifts.

Crevasse: Crevasses (shelf or pack ice terrain/any snow cover) are deep cracks in the ice, difficult to cross and time-consuming to avoid. When a crevasse occurs, the referee should roll 1d; this gives the number of roughly parallel crevasses encountered. A second roll of 2d establishes the relative position of the crevasses to the party's line of approach. On an 8+, they run parallel to the party's route. Any other result indicates that they run across the party's path.

In the first case, the crevasses present little direct danger to the party, unless they are forced by further encounters or events to deviate from their original course. The referee must designate the exact relationship of the crevasses to the party in such a case. The crevasses continue to run parallel to the line of march for 2dx10 minutes of travel time on foot, or 1dx10 minutes if using vehicles.

A party that is faced with crevasses blocking their direction of travel is faced with greater difficulties. A detour can be attempted; roll 2dx10 minutes to determine the length of time consumed by a detour on foot, or 1dx10 minutes to determine the length of time consumed by a detour on foot, or 1dx10 minutes for a vehicle detour. However, an additional 2d roll is made, with a DM+2 if the group is using vehicles; on a roll of 11+, there is no safe detour, and it will be necessary to find a way across the crevasse, or backtrack for 1d hours to find an alternate route.

If a crossing is to be undertaken, a bridge of ice or packed snow must be found. A bridge exists on a throw of 7+; if found, roll on the thin ice table to establish the weight the bridge can bear. Note that most vehicles will be unable to cross

such bridges in safety, and must backtrack and find an alternate route. Use the thin ice crossing procedure to determine the success of the crossing; in a crevasse, however, collapse of the ice bridge does not necessarily result in immersion; on a 5+, the crevasse has a solid floor, and a character who falls takes 2d damage, and must climb out using ropes. Otherwise, the crevasse is actually a deep polynya, and the character will indeed fall in. In this case, characters cannot get out of the water on their own, but must instead be pulled out.

All crevasses have an additional danger associated with them, that of cornices of snow. See the event description below.

Cornice: When walking along or attempting to cross a crevasse (crevasses/shallow or deep snow cover), a character will encounter a cornice on a roll of 9+; DM+1 in shallow snow cover, DM+2 in deep snow cover or hardpack snow, DM-5 if no snow cover is present. If a cornice is present, the Lead member of the party will notice it on a throw of 8+, DM+ Arctic Survival skill.

If the cornice is not noticed, it is treated as a special case of thin ice; roll 1d+1 on the thin ice table to determine the weight that can be supported, and resolve the situation as outlined in the section on thin ice.

If a cornice gives way, the result is the same as having a crevasse ice bridge give way. See the previous event description for the procedures involved.

EVENTS AND GAME MECHANICS

The referee is urged to assemble event tables for arctic terrain, one table per terrain type. The tables regulate the possibilities of various encounters and events, including animal encounters, taking place. The table below shows a typical table. Once every hour, roll on the table, with all applicable DMs; the results direct the referee to a specific event or to another roll on an appropriate animal encounter table.

Such event tables should be tailored for the specific nature of individual planets. Some of the events discussed above won't be present; in other cases, new events or special encounters may be introduced. Thus, the table below is simply a sample, designed to give the referee a guideline for formatting and possible content.

Sample Event Table

PACK ICE TERRAIN	
Die Roll (2d)	**Event or Encounter**
2-	Animal Encounter
3	Animal Encounter
4	Suncups
5	No Event
6	No Event
7	No Event
8	No Event
9	Polynya
10	Thin Ice
11	Thin Ice
12	Crevasse
13	Suncups
14	Whiteout
15	Drift
DM+3 in Deep Snow	
DM+1 in Shallow Snow	
DM-2 in Temperatures -18°C or Higher	

Adventures in the Arctic Environment

The material presented in this booklet makes it possible for referees to put together, and players to experience, adventures which elaborately recreate the dangers of the arctic environment. Not all these rules need to be used, but, with this booklet, arctic conditions can be simulated in considerable detail.

Since these extensive rules are available, it seems proper to take the time for some short, basic adventure suggestions. Operations in the arctic environment can make fascinating and exciting changes of pace from the normal *Traveller* adventure backdrop.

PLANETARY ENVIRONMENT

It is common to mislabel science fiction worlds with a one-word description, such as "iceworld," as if the entire planet were exactly the same (reminiscent of the famous line "It was raining on the planet Mongo...") But though this is a misnomer, it is true that there will be worlds where average temperatures will be well below freezing even at the equator, making for an interesting setting for *Traveller* adventures.

Such worlds will probably support human-conditioned colony domes or other buildings, but, outside, the principles of the arctic environment will hold true. A wide variety of adventure situations can be set on such worlds.

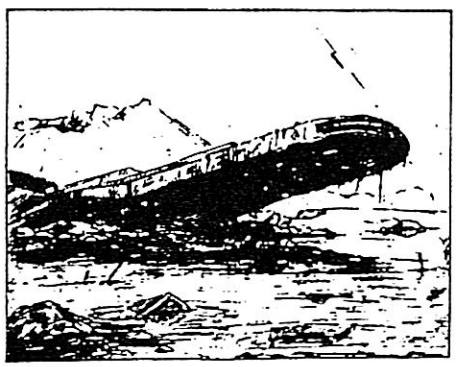
However, almost any world will support Polar Regions where low temperatures prevail, even those planets we would like to stereotype as "desert worlds" or "jungle worlds." For guidelines in the creation of temperature zones on a world, see the Gamelords supplement *Grand Survey.*

EXPLORATION

The exploration or arctic regions offer possibilities for adventure. A continent locked under perpetual ice and snow can hold many untapped secrets, such as fuel and resource reserves, which may be worth discovering. In some cases, exploration of arctic regions is simply a challenge to those who seek thrills or the pride of doing what others cannot do. Any form of exploratory endeavor can serve as a backdrop for adventure.

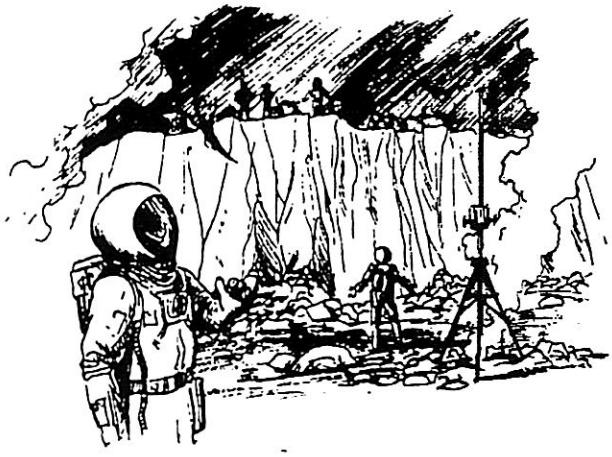
SURVIVAL

A crash-landing or a shipwreck in arctic conditions can make for a tense adventure situation. A party marooned in such an environment, without the full-scale preparations of an expedition intended to enter the arctic, will face problems of survival that can become a major adventure scenario. The group that walks out of the deep arctic wastes can feel proud of their tenacity and abilities ever afterwards.



RESCUE/SALVAGE

On the other end of the shipwreck picture is the relief or salvage expedition, dispatched in hopes of assisting the victims of such a disaster or of recovering valuable items from a crash without survivors. Such situations become even more trying in the face of opposition, not only from the elements, but from some intelligent opposition bent on recovery or rescue for their own nefarious purposes.



HUNTING

Safaris need not be mounted in jungle regions; animal life can attract hunters in dangerous arctic conditions. "Hunters" can include not only trophy hunters, but also scientists studying animal behavior, wildlife photographers, conservationists tracking the movements of an endangered species, and a wide variety of other individuals who have as their primary purposes the discovery and pursuit of animal life.

MILITARY MISSIONS

The military or paramilitary operation is a common one in *Traveller*. Operations in arctic conditions are more hazardous, but offer a variety of interesting situations and opportunities. A mercenary unit or commando team operating in a subzero climate can be an interesting variation on the usual cut and dried military adventure or *Striker* scenario.

FINAL NOTES

These suggestions and ideas are only the tip of the iceberg (if the pun can be pardoned), just as the rules, equipment, and events discussed in this booklet are in themselves far from definitive or absolute. Referees are urged to make use of all of the concepts and ideas presented here in whatever way best sums up the approach preferred by that referee and that group. This material can be used or discarded as desired, provided that the referee's final product grants the best possible game to all involved. This booklet is intended to show the way... but it is a guide, not necessarily the end product of the creative process.

FURTHER IDEAS

Referees desiring some additional ideas for adventures involving *The Arctic Environment* are urged to consider the following sources.

Ice Fortress: This adventure from Gamelords follows an expedition through the arctic wastes of an Earthlike world in search of an abandoned military base-and a cache of royal treasure of incalculable value, both monetarily and politically. The adventure makes heavy use of the principles outlined in this booklet.

Books: A variety of excellent novels involving arctic adventures may serve as inspiration for a scenario or a campaign. Some that the author particularly recommends include:

- *Icerigger*, by Alan Dean Foster. Ballantine, 1974.
- *Mission to Moulokin*, by Alan Dean Foster. Ballantine, 1979.
- *The Deluge Drivers*, by Alan Dean Foster. Ballantine 1987.
- *Ice Station Zebra*, by Alistair MacLean. Doubleday, 1963.
- *World war III*, by Brian Harris. Simon & Shuster, 1982.

SECTION III: APPENDIX

Tables and Charts

BASIC TERRAIN TABLES

ARCTIC OR SUBARCTIC REGIONS

Land Hex		Water Hex	
Die Roll	Terrain	Die Roll	Terrain
1	Tundra/Permafrost	1	Pack Ice
2	Tundra/Permafrost	2	Pack Ice
3	Tundra/Permafrost	3	Pack Ice
4	Tundra/Permafrost	4	Pack Ice
5	Rugged	5	Pack Ice
6	Temporary Ice *	6	Pack Ice
7	Rugged	7	Shelf Ice
8	Mountainous	8	Shelf Ice
9	Mountainous	9	Shelf Ice
10	Mountainous	10	Shelf Ice
DM+2 in "Rugged" Hex Terrain		DM+2 Adjacent to Land Hex	
DM+4 in "Mountainous" Hex Terrain		DM+4 in Coastal Hex	

This table can be used in one or two ways. First, when preparing a map with a scale of 1 hex = 10 km or less, roll 1d for each hex to determine the basic terrain. (Temporary ice would indicate the site of a lake or stream).

Secondly, in a freeform system of travel where no map is used, roll once per hour for current terrain.

* Requires hydrosphere, otherwise treat as Tundra/Permafrost.

CLOUDINESS AND HUMIDITY

Hydrographic Code	Cloudiness Percentage	Cloudiness Factor	Humidity Factor	Snow Cover Chance
0	0	0	0	0
1	0	0	1	1
2	10	1	1	2
3	10	1	2	3
4	20	2	3	4
5	30	3	4	5
6	40	4	5	6
7	50	5	6	7
8	60	6	7	8
9	70	7	8	9
A	70	8	9	9

If atmosphere A+, increase cloudiness percentage, cloudiness factor, and humidity by +40%/+4; snow cover increases by a like amount if atmospheric conditions permit (referee judgement on atmosphere composition and temperature). If atmosphere 3-, reduce cloudiness to a maximum of 20%, and use that line for all factors. If atmosphere D, divide all table values by 2.

SNOWFALL MODIFIERS

Condition	Modifier
Winter Season	-2
Full Ocean/Ice Hex	+2
Coastal/Ice Hex	+1
Tundra/Permafrost Hex	+1

SNOW COVER TABLES					
ICE TERRAIN		TUNDRA/PERMAFROST TERRAIN		OTHER TERRAIN	
Die Roll	Type of Cover	Die Roll	Type of Cover	Die Roll	Type of Cover
1	Powder (Hardpack)	1	Powder (Hardpack)	1	Powder (Hardpack)
2	Deep (Hardpack)	2	Deep (Hardpack)	2	Deep (Hardpack)
3	Powder (No Hardpack)	3	Powder (No Hardpack)	3	Deep (No Hardpack)
4	Wet (Hardpack)	4	Wet (Hardpack)	4	Hardpack
5	Hardpack	5	Spotty (No Hardpack)	5	Wet (Hardpack)
6	Powder (Hardpack)	6	Hardpack	6	Powder (Hardpack)
7	Wet (Hardpack)	7	Wet (Hardpack)	7	Spotty (No Hardpack)
8	Wet (No Hardpack)	8	Wet (Hardpack)	8	Wet (No Hardpack)
9	Powder (Hardpack)	9	Powder (Hardpack)	9	Powder (Hardpack)
10	Powder (No Hardpack)	10	Wet (No Hardpack)	10	Wet (Hardpack)
11	Wet (No Hardpack)	11	Spotty (No Hardpack)	11	Deep (Hardpack)
12	Deep (No Hardpack)	12	Deep (No Hardpack)	12	Deep (No Hardpack)
13	Spotty (No Hardpack)	13	Spotty (No Hardpack)	13	Spotty (No Hardpack)
DM+1 if Temperature is above -5°C					
DM-1 if Temperature is below -10°C					

Presence of Snow Cover

Once basic Temperature is established, roll less than "Snow Cover Chance" on the Cloudiness and Humidity table, on 2d, with all applicable modifiers from the Snowfall Modifiers chart applied. If the throw is achieved, roll on the appropriate Snow Cover table. Otherwise, no snow is present.

SNOW STORM INTENSITY AND DURATION		
Die Roll	**Intensity**	**Duration**
2-	Light (Intermittent – DM+3)	1d Hours
3	Light (Intermittent – DM+3)	1d Hours
4	Light (Steady – DM+2)	1d Hours
5	Light (Steady – DM+2)	1d x 2Hours
6	Moderate (Intermittent – DM+1)	1d x 3 Hours
7	Moderate (Intermittent – DM+1)	1d x 3 Hours
8	Moderate (Steady – DM=0)	1d x 3 Hours
9	Moderate (Steady – DM=0)	1d x 6 Hours
10	Heavy (Intermittent – DM-1)	1d x 6 Hours
11	Heavy (Steady – DM-3)	1d x 12 Hours
12	Blizzard (DM-5)	1d Days
Roll once for intensity, and a second time for duration, applying given modifiers from intensity for duration.		

SNOWFALL RESULTS	
Intensity	**Rate of Accumulation**
Light (Intermittent)	¼ cm per 3 Hours
Light (steady)	¼ cm per 2 Hours
Moderate (Intermittent)	¼ cm per Hour
Moderate (Steady)	½ cm per Hour
Heavy (Intermittent)	¾ cm per Hour
Heavy (Steady)	1 cm per Hour
Blizzard	2 cm per Hour

SNOWFALL TYPE	
Die Roll	**Type of Snowfall**
0	Powder Snow
1	Powder Snow
2	Powder Snow
3	Powder Snow
4	Powder Snow
5	Powder Snow
6	Wet Snow
7	Wet Snow
8	Wet Snow
DM-1 if Light or Blizzard	
DM+1 if Moderate	
DM+2 if Heavy	
Procedure: Snowfall occurs on any day on which a 2d roll is less than the humidity factor (Cloudiness and Humidity table), as adjusted for Snowfall Modifiers. Roll for intensity and duration of snow on Intensity/Duration Table. Roll on the Snowfall Type Table to determine the nature of the snow cover that results. Accumulation is based on duration and snowfall rate, from the Snowfall Results Table.	

SNOW COVER DEFINITIONS	
New Snow Cover	**Depth of Accumulation**
Spotty Snow Cover	Less than ½ cm accumulation
Shallow Snow Cover	½ cm to 3 cm accumulation
Deep Snow Cover	More than 3 cm accumulation

TEMPERATURE

Basic Local Temperature			
Die Roll	**Temperate-Winter Region**	**Subarctic Region**	**Arctic Region**
1-	-30°C or less	-150°C or less	-100°C or less
2	-25°C	-100°C	-75°C
3	-20°C	-75°C	-70°C
4	-15°C	-50°C	-60°C
5	-10°C	-40°C	-60°C
6	-5°C	-30°C	-50°C
7	-5°C	-20°C	-50°C
8	0°C	-10°C	-40°C
9	0°C	-5°C	-30°C
10	+5°C	-5°C	-20°C
11	+5°C	-5°C	-20°C
12	+5°C	0°C	-5°C
13	+10°C	+5°C	0°C
Die Modifiers are assigned by the referee based on the nature of the world or area (a referee judgement call).			

TEMPERATURE MODIFICATIONS								
		First Die Roll						
		1-	**2**	**3**	**4**	**5**	**6**	**7+**
Second Die Roll	**1**	0 kph Steady	0 kph Steady	8 kph Steady	8 kph Steady	8 kph Gusty	16 kph Steady	24 kph Gusty
	2	0 kph Steady	8 kph Steady	8 kph Steady	8 kph Gusty	16 kph Gusty	24 kph Steady	32 kph Gusty
	3	0 kph Steady	8 kph Steady	8 kph Gusty	16 kph Steady	24 kph Gusty	32 kph Steady	40 kph Gusty
	4	8 kph Steady	8 kph Gusty	16 kph Gusty	24 kph Steady	32 kph Gusty	40 kph Steady	48 kph Gusty
	5	8 kph Gusty	16 kph Steady	24 kph Gusty	32 kph Steady	40 kph Gusty	48 kph Steady	56 kph Steady
	6	16 kph Steady	24 kph Gusty	32 kph Steady	40 kph Gusty	48 kph Steady	56 kph Gusty	60 kph Steady

DIE MODIFICATIONS	
First Die Roll	**Second Die Roll**
DM-1 in light storm DM+1 in heavy storm DM+2 in blizzard	DM-1 if no storm

MOVEMENT EFFECTS TABLE						
Character Is...	**Snow Movement**	**Snow Endurance**	**Snow Mishap**	**Ice Movement**	**Ice Endurance**	**Ice Mishap**
On Foot	1/.75/.5	H/H/V	11+	.5	V	6+
On Snowshoes	1/1/.75	V/V/V	10+	.5	V	7+
On Skis	O/S/S	–/H/H	8+	.5	V	8+
On Skates	NO	–	--	1	H	8+
In Wheeled Vehicle	1/.5/0	L	9+	.25	L	7+
In Tracked Vehicle	1/.5/.25	L	10+	.5	L	9+
In Snowmobile	1/.75/.5	L	11+	.5	L	9+
In Iceboat	NO	--	--	Var	L	9+
In Sled	0/1/.75	L	10+	.25	L	9+

Snow Movement is for Spotty/Shallow/Deep snow; treat hardpack as shallow snow for all purposes. Numbers are multipliers to basic movement rate. S indicates that speed is based on ski speed table, below.

Endurance losses are for Spotty/Shallow/Deep snow, giving the level (Light, Heavy, or Very Heavy – L, H, V) of exertion involved. See the Endurance rules.

The Mishap throw gives the likelihood of an accident, on 2d.

Var – Variable; See Iceboats in the Vehicle rules.

SKI MOVEMENT	
Slope Angle	**Speed in kph**
3° Downhill	Up to 36 (6 km per 10 min)
5° Downhill	Up to 50 (8 km per 10 min)
10° Downhill	Up to 80 (13 km per 10 min)
20° Downhill	Up to 120 (20 km per 10 min)
30° Downhill	Up to 145 (24 km per 10 min)
45° Downhill	Up to 175 (29 km per 10 min)
0-3° Uphill (or level)	Up to 20 (3 km per 10 min)
5° Uphill	Up to 10 (1.5 km per 10 min)
10° Uphill	Up to 5 (.75 km per 10 min)
20° Uphill	Up to 3 (5000 meters per 10 min)
Higher uphill slopes not generally traversable on skis. Speeds can be largely controlled by skier.	

CLOTHING				
Clothing Type	**Underclothes Protection**	**Clothes Protection**	**Overclothes Protection**	**Outer Clothes Protection**
Standard Clothes	1	3	1	NA
Jack Armor	NA	5	3	NA
Mesh Armor	2	4	2	NA
Cloth Armor	NA	6	4	NA
Reflec Armor	2	3	NA	NA
Ablat Armor	3	4	NA	NA
Combat Armor	NA	NA	NA	150 (+)
Vacc Suit	NA	NA	NA	150 (+)
Protective Suit	NA	NA	NA	10
Heavy Protective Suit	NA	NA	NA	12
Cold Weather I	3	NA	5	10
Cold Weather II	5	NA	10	15
Sheltersuit (Unp)	NA	NA	10	15
Sheltersuit (POW)	NA	NA	50 (+)	50 (+)
Combat Env. Suit	NA	NA	25	NA
Augmentation *	NA	NA	5	NA
Battle Dress	NA	NA	NA	150 (+)
Cold Weather III	7	NA	15	20

NA – Clothing of that type not available
Armor protection may not be combined, except by standard rules.
(+) – thermostat; any temperature up to given limit may be set.
* Augmentation: Heated bricks, catalytic heaters, etc. inside clothes.

THE ARCTIC ENVIRONMENT

THE ARCTIC ENVIRONMENT is a ***TRAVELLER*** supplement dealing with the particular hazards and special situations of travel and survival in sub-zero climates. Included are specific rules designed to simulate arctic weather conditions, explanations of equipment of use to characters venturing into an arctic clime, and a guide to the special events and encounters which may take place under arctic conventions.

Challenge your players to broaden their horizons by entering **THE ARCTIC ENVIRONMENT.**